

CONTRIBUTIONS TO THE KNOWLEDGE OF  
SOUTH AFRICAN MARINE MOLLUSCA

PART I. GASTROPODA: PROSOBRANCHIATA: TOXOGLOSSA

By

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(With 30 figures in the text and 1 plate)

INTRODUCTION

A vast amount of research will be necessary before a comprehensive and reliable monograph on South African Marine Mollusca can be produced. Therefore the following work is only a preliminary account of some of the species known to inhabit South African seas, and of their distribution around the coast.

It is based mainly on the collections in the South African Museum, and the collection made during the University of Cape Town's Ecological Survey. Of the former the most important is the collection made by the Cape Government trawler s.s. *Pieter Faure*. The latter comprises material, collected alive, from the intertidal zone and the estuaries, and by dredging in a few localities.

In South Africa, perhaps more than in other regions, the study of mollusca has suffered from the enthusiasm of shell-collectors, most of whom have been beach-combers with little or no interest in the living animals. Large numbers of dead shells have been described and given scientific names by overseas specialists, often without fully appreciating the possibilities of variation in coloration and pattern, or of the alteration in shape and sculpture which can be produced by beach-rolling.

'The fauna of a few favourite and accessible strands is adequately known, mainly of course from dead and more or less beach-worn material. When "live" examples, dredged or otherwise, do turn up, it is frequently a matter of the greatest difficulty to appraise their relationship with the worn types or battered series which constitute all that is hitherto available.' (Tomlin. *Ann. S. Afr. Mus.*, xxv, p. 313, 1928.)

Thus a check-list would contain many hundreds of *names*; but how many of these names denote true species—species which a zoogeographer can regard as components of the South African fauna, and can accept for comparison with the faunas of other regions?

In past years, in addition to the persistent describing of '*species abrasae litoris*', erroneous identifications have swelled the list.<sup>1</sup> On the other hand,

<sup>1</sup> Tomlin. 1922. *J. Conch.*, 16, 256-8.

energetic collecting of living molluscs has drastically reduced it, e.g. in the genus *Patella*.<sup>2</sup>

Dead shells recorded from the greater part of the South African coast—from the Cape to Pondoland or southern Natal—may be accepted in most cases as genuine inhabitants of these waters, especially species whose shells occur in abundance, because the habitats of the living animals are likely to be close at hand.

Very different, however, is the case of records from Natal and Zululand, whose shores are washed by the southward flowing Mozambique current, rendering possible the existence of many tropical Indo-Pacific species. Here an element of doubt creeps in, because most collectors do not confine themselves rigidly to one area, but include in their collections shells from neighbouring regions, e.g. the east coast of Africa or Mauritius. They may have spent a holiday in those areas, or accepted shells from friends; in the latter case the locality is hearsay. How many of the Indo-Pacific species of *Conus* or *Cypraea* (collectors' 'favourites'), which have been recorded from Durban or Natal, are known to live in South African waters and thus entitled to inclusion in the fauna-list?<sup>3</sup>

Another source of error, known to have occurred sometimes in entries in Museum accession registers, and suspected in some published records of localities, lies in recording the *domicile of the collector* (or donor) as the habitat of the mollusc.<sup>4</sup>

These remarks are not intended to discredit collectors, but to show that the only (scientifically) good mollusc is a live one.

A full historical account of the growth of our knowledge of South African molluscs must wait for inclusion in a monograph, but a few of the more important steps may be mentioned here.

Dr. Ferdinand Krauss visited the Cape and Natal in 1840. He himself collected and described many molluscs, and the beautiful illustrations in his work have scarcely been surpassed.<sup>5</sup> He did no dredging, but it is obvious that, for the most part, he collected living specimens.

In later years several beach-combers made collections which were submitted to overseas conchologists, e.g. Dr. E. Fritsch (1874), S. D. Bairstow, Dr. H. Becker, and Lt.-Col. W. H. Turton.

After his earlier collections had been described (by Edgar Smith, and Bartsch), Turton himself undertook the description of his main collection. His work may be described as a *tour de force*, but it is a stumbling-block to students of South African molluscs because it obviously contains many synonyms, which

<sup>2</sup> Tomlin & Stephenson. 1942. *Proc. Mal. Soc.*, 25, 4; Koch. 1949. *Ann. Natal Mus.*, XI, 487.

<sup>3</sup> cf. Sowerby. 1889. *J. Conch.*, 6, 10.

<sup>4</sup> Bairstow lived at Port Elizabeth, but did the recorded specimen of *Purpura trigona* really come from Port Elizabeth? Did Mrs. Trotter's example of *Voluta festiva* really come from Natal?

<sup>5</sup> *Die südafrikanischen Mollusken*. Stuttgart, 1848.



can only be correctly assigned by the re-examination of his collection (at Oxford) by someone thoroughly conversant with the South African fauna.

H. C. Burnup was a most careful and assiduous collector, especially of living material. The animals he sent to Professor Gwatkin, who extracted the radulae, but no shells were sent for verification.<sup>6</sup> In this manner errors are liable to occur, and indeed have occurred (e.g. *Euthria queketti*).

The littoral fauna, however, is but a small part of the fauna of a marine province. Several overseas expeditions have 'fished' molluscs in our waters. The U.S. North Pacific Exploring Expedition visited Simon's Bay in 1853, and the naturalist W. Stimpson collected both on shore and by dredging.<sup>7</sup>

H.M.S. *Samarang*, H.M.S. *Sulphur* and H.M.S. *Challenger* added to our knowledge. Later, with improved methods, and probably more care in sorting the material, the German Deep-sea Expedition (*Valdivia*) obtained many new species.<sup>8</sup>

All these expeditions were passing voyages. The first systematic exploration of the coastal seas around South Africa was carried out by the Cape Government under the direction of Dr. J. D. F. Gilchrist (Government Biologist, 1895-1907). The object was primarily economic: to discover payable fishing-grounds for steam-trawlers, but the scientific aspect was by no means neglected. During the years 1897-1907 the Cape Government trawler s.s. *Pieter Faure* operated around the coast from St. Helena Bay to Zululand, mostly in shallow and moderate depths, but down to 400 fathoms off East London and Natal, and 1,000 fathoms off Cape Point.

Large collections of marine organisms were obtained which, on the discontinuance of the Survey, were transferred to the ownership of the South African Museum (1910).

As regards the Mollusca the 'cream' of the collection was reported on by G. B. Sowerby (Third) before the collection came to the South African Museum.<sup>9</sup> After registration further material was submitted to the late J. R. le B. Tomlin.<sup>10</sup>

The reports by these two specialists are almost entirely *conchological*. In only very few instances did Sowerby mention the anatomy or the radula, although several of the novelties were described from specimens containing the animal. There is evidence to show that Professor Gwatkin extracted the radulae of some of these animals.<sup>11</sup> Excepting two species, all the material sent to Tomlin was dry.

<sup>6</sup> Cooke. 1919. *Proc. Malac. Soc.*, 13, 109.

<sup>7</sup> See: Bartsch. 1915. *Bull. U.S. Nat. Mus.*, no. 91, p. 2.

<sup>8</sup> Von Martens. 1903. *Wiss. Ergebn. D. Tiefsee Exp.*, 7; Thiele. 1925. *ibid.*, 17; Thiele & Jaeckel. 1931. *ibid.*, 21.

<sup>9</sup> *Marine Investigations in South Africa*, i-v, 1898-1908. N.B. The dates of publication of the reports in this work are frequently earlier than the dates on the title-pages of the respective volumes. See: Barnard. 1950. *J. Soc. Biol. Nat. Hist.*, 2, 6, 187.

<sup>10</sup> *Ann. S. Afr. Mus.*, 20, 1925; 25, 1927-8; 29, 1931; 30, 1932 & 1934.

<sup>11</sup> e.g. *Conus patens*. See: p. 90.

The greater part of the *Pieter Faure* collection of Mollusca, when transferred to the Museum, was preserved in formalin (later changed to alcohol), the exceptions being the specimens returned dry by Sowerby. On two occasions (one before the present writer was appointed to the staff, the other when he was overseas on leave), the collection was encroached upon to provide a representative series of South African molluscs for the public exhibition galleries. There would have been no objection to this procedure if the animals extracted from their shells had been replaced in the jars and preserved. They were not, though the opercula were neatly mounted in the customary manner. Thus, most regrettably, several species, the animals of which would have supplied most desirable taxonomic data, remain known to science by their shells alone.

Nevertheless the hitherto unknown radulae of several species have been obtained, and are described in the present work. Not unexpectedly, some species are shown to have been wrongly classified.

Recent examination of the *Pieter Faure* bottom-samples has resulted in finding not only several additions to the fauna-list (e.g. in the family *Turritidae*), but also further examples of species hitherto known only from singletons (e.g. *Drillia fossata* Sow., *Solariella persculpta* Sow., *Heliacus petasus* Tomlin) and unworn specimens of species known only from beach-worn examples (e.g. *Afritrophon insignis*). Moreover these bottom-samples have supplied data for plotting the distribution of some of the species; for this purpose broken examples and even small fragments, if the sculpture is distinctive, are useful.

The Museum Molluscan collections comprise also several private collections which have been acquired in the course of years by gift and bequest. While most of the shells in these collections are of little use for scientific purposes, examination of large quantities, sometimes hundreds of one and the same species, often provides successive stages in weathering and abrasion and thus a clue to the manner in which natural agencies can produce 'new species' for the over-enthusiastic conchologist.

The collection bequeathed by the late Dr. John Muir of Riversdale must be specially mentioned. In his retirement he patiently sorted through bagfuls of sand collected at Still Bay, and thereby obtained an extremely useful collection of the smaller species (*Turbonilla*, *Eulimella*, *Alvania*, etc.).

At the suggestion of the present writer he concentrated on tracing the growth, from protoconch upwards, of the commoner species. These series have been of great value in the present work, in which special attention has been paid to the protoconch and early whorls with a view to providing more precise definitions of the species.

Some of the features of the South African marine province have been discussed by von Martens (1903) and Tomlin (1922). Tomlin has cleared the ground by excluding records of European species based on erroneous identifications, due probably to beach-worn material. But comparison with other marine provinces is scarcely justified until at least the great majority of the species have been correctly classified. As an example, the Antarctic genus *Glypteuthria* has

been recorded from Cape waters; but one of the species assigned to this genus has been shown to belong to a different family (Barnard, 1957), and the other is a *species inquirenda*. Therefore this genus cannot be claimed as indicating an Antarctic element in the South African fauna.

The recent identification (Knudsen, 1956) of a West African *Nassa* (*Nassarius*) with a Natal species (*N. desmoulioides*); the extraordinary likeness of the West African *Pleurotoma spiralis* Smith and the South African *P. fultoni* Sow.; and the discovery of shells off the coasts of West Africa and South West Africa apparently identical with the Italian Pliocene-Miocene *Cancellaria* (*Sveltia*) *lyrata*, open up tantalizing zoogeographical questions.

Mention may be made of one feature alluded to by von Martens (1903, p. 56), viz.: the pink coloration of several South African shells. Von Martens gave examples showing that it is 'characteristic' of shells in different families. Here again the beach-worn specimen has given a false impression. *Gibbula rosea* and *Coralliophila rosacea* may have a beautiful pink colour when picked up on the beach, but they are not at all pink when alive. A pink coloration may be normal in some species, but in others is obviously the result of weathering and chemical action. In the South African Museum collection there is a *Conus* which is *aurora* on one side and *lavendulus* on the other; a clear proof of the identity of the two so-called 'species'!

Mauve or lavender is another noticeable tint occurring chiefly on the protoconch and early whorls of some shells, e.g. *Eugyrina pustulata* and *Demoulia retusa*.

#### TAXONOMY

The present work admittedly shows some conservatism in retaining some of the old-established and well-known generic names in preference to adopting a more modern taxonomy, in which a multiplicity of genera has been founded often on characters which seem to be meagre or artificial. In the case of the Cowries this splitting-up has been carried to such a fantastic extent that, of the several hundreds of known species, *only one* remains in the original genus *Cypraea*.

It seems doubtful whether this increasingly complex classification is of any real help to zoology, in particular to faunistic zoology.

Thiele (e.g. 1929, p. 368) objects to the use of the name of a fossil genus for a recent genus, however much alike they may be conchologically. The anatomy of the extinct animal can never be known. This very sound principle applies equally to species. In the above-mentioned case of *Cancellaria lyrata* the present writer considers it would be preferable to give the recent examples a separate specific name.<sup>12</sup> Zoogeographical conclusions based on the assumption that the fossil and Recent examples are conspecific may be erroneous and are certainly unscientific.

<sup>12</sup> Perhaps a trinomial addition would meet the case, e.g. *Cancellaria lyrata vivans*.



## ACKNOWLEDGEMENTS

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Tribute must also be given to H. C. Burnup (†1928) and J. R. le B. Tomlin (†1954), with whom I discussed synonymies and other matters relating to South African Molluscs for many years.

## ABBREVIATIONS

- P.F. . . The Cape Government trawler s.s. *Pieter Faure*.  
 U.C.T. . . University of Cape Town Ecological Survey.  
 U.W. . . University of the Witwatersrand Zoology Department.

Specimens taken by the s.s. *Africana*, Fisheries Survey, Union of South Africa, were submitted through Prof. Day of the University of Cape Town.

Fam. *TEREBRIDAE*

1928. Tomlin. *Ann. S. Afr. Mus.*, xxv, p. 329 ('records . . . so scanty that any additional information is worth chronicling').

Species recorded from South Africa, but whose occurrence in South African waters has yet to be confirmed:

<i>Hastula apicina</i> (Desh.)	<i>Terebra macandrewi</i> Smith
„ <i>cuspidata</i> (Hinds)	„ <i>monilis</i> Q. & G.
<i>Terebra archimedis</i> (Desh.)	„ <i>pertusa</i> Born.
„ <i>babylonia</i> Lam.	„ <i>raphanula</i> Lam.
„ <i>cingulifera</i> Lam.	„ <i>subulata</i> Linn.
„ <i>grayi</i> Smith	„ <i>textilis</i> Hinds
„ <i>livida</i> Rve.	„ <i>tiarella</i> Desh. ? a Columbellid

*Species inquirendae* (only one specimen of each known):

<i>Terebra filmerae</i> Sow.
„ <i>kowiensis</i> Turton ( <i>v. infra</i> )

For convenience the shells may be separated into two groups:

No spiral groove: *Hastula apicincta* Sow., *casta* var. *natalensis* Smith, *Terebra diversa* Smith, *filmerae* Sow., *kowiensis* Turton, *lightfooti* Smith, *planecosta* n. sp., *thielei* n. sp.

With spiral groove: *Diplomeriza duplicata* (Linn.), *fictilis* (Hinds), *Terebra affinis* Gray, *babylonia* Lam., *capensis* Smith, *cingulifera* Lam., *circinata* Desh., *dimidiata* Linn., *evoluta* Desh., *laevigata* Gray, *loisae* Smith, *longiscata* Desh., *monilis* Q. & G., *myuros* Lam., *nebulosa* Sow., *spectabilis* Hinds, *straminea* Gray, *subulata* Linn., *suspensa* Smith.

*Terebra circinata* Desh.

Delagoa Bay. One animal examined: no radula.

*Terebra myuros* Lam.

Off O'Neil Peak (Zululand), 55 fathoms (S. Afr. Mus. P.F. Coll.); Natal (S. Afr. Mus.).

The badly worn P.F. specimen is stouter than normal (less 'rat-tail'-like). The Natal specimen is slightly worn, but retains its colouring. The exact locality is not recorded, but the P.F. specimen allows this species to be added to the South African fauna-list.

S. Afr. Mus. also has specimens collected by E. L. Layard (on board H.M.S. *Castor*, 1856) at Farquhar Island (10° S., 51° E.).

*Terebra straminea* Gray

Off O'Neil Peak (Zululand), 55 fathoms (S. Afr. Mus. P.F. Coll.). Two somewhat worn specimens.

*Terebra lightfooti* Smith

Fig. 1 c

Table Bay, 22 fathoms, 11 dead; twelve miles S.E. of Cape Point, 45 fathoms, 2 dead but fresh; Brown's Bank (approx. 36½° S., 21° E.), 80-100 fathoms, 1 dead. (S. Afr. Mus. P.F. Coll.) Living: False Bay, 52 metres (U.C.T.).

Apex corroded in all specimens seen, but protoconch seemingly 2-whorled.

*Terebra capensis* Smith

Fig. 1 e

Protoconch 2 whorls, alt. and diam. 0.5 mm., smooth. Very fine spiral striae in the intervals between ribs, c. 10 on early whorls, becoming fewer and irregularly spaced on later whorls.

Still Bay, dead shells common (S. Afr. Mus. Muir Coll.).

Off Cape St. Blaize, 37 fathoms, 1 dead (S. Afr. Mus. P.F. Coll.).

The record from Karachi (1901. Melvill and Standen. *Proc. Zool. Soc. Lond.*, ii, p. 428) is probably a misidentification.

*Terebra suspensa* Smith

Protoconch 2-2½ whorls, alt. and diam. 0.75 mm., smooth.

Pleistocene deposits at Sedgefield, Groenvlei (Knysna district). (S. Afr. Mus.) See A. R. H. Martin. *S. Afr. J. Sci.*, 52, p. 187, 1956.

Still Bay, dead shells (S. Afr. Mus. Muir Coll.).

*Terebra diversa* Smith

Protoconch 2 whorls, alt. and diam. 0.5 mm., smooth.

No records west of Pondoland (S. Afr. Mus.) except the single specimen recorded by Bartsch (1915, p. 11) as collected by Stimpson in False Bay during the U.S. North Pacific Exploring Expedition. Like other species collected on this expedition the specimen bears a *low* register number in the U.S. Nat. Mus. Catalogue (see Bartsch, *passim*), and its provenance can therefore be accepted.

*Terebra affinis* Gray

S. Afr. Mus. has 2 (one very worn) from Delagoa Bay. Also collected by Layard (on board H.M.S. *Castor*, 1856) at Farquhar Island.

*Terebra spectabilis* Hinds

Two specimens in good condition but evidently not alive when dredged: off Amatikulu River (Zululand), 24 fathoms; and off Cape Natal (Durban), 54 fathoms (S. Afr. Mus. P.F. Coll.).

The 32 mm. Zululand specimen was identified by Sowerby.

*T. geminata* Desh. 1859 was considered a synonym by Sowerby (1897).

*Terebra longiscata* Desh.

Off Cape Natal (Durban), 54 fathoms, 1 dead (S. Afr. Mus. P.F. Coll.).

*Terebra casta* Hinds

Typical form (with flat ribs): Nacala, north of Mozambique Island (U.W.).

In var. *natalensis* the protoconch has 4½-5 whorls, alt. 0.75 mm., diam. 1st whorl *c.* 0.15, 5th whorl 0.5 mm., smooth, dark maroon or purplish-brown.

The variety seems to merit the epithet 'tinted apex' far more than Sowerby's *apicitincta*.

No animal available for determining the correct genus.

*Terebra dimidiata* Linn.

Living: Delagoa Bay (U.W.). Animal (as preserved) yellowish-brown.

S. Afr. Mus. has it from Fernão Veloso Bay, north of Mozambique Island (from the collection of P. Ross Frames).

*Terebra thielei* n. sp.

Fig. 1 d

? 1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 256, pl. 41 (29), fig. 17. (*Terebra* sp., part).



Four specimens, 4-6.5 mm. in length, with 3 or 4 postnatal whorls; 11 axial ribs on 1st whorl, increasing to 14-15 (16), the ribs are broadly rounded with narrower intervals, contrasting with the narrowly rounded ribs and wide intervals of *capensis*; no spiral groove or spiral striae.

33° 50' S., 25° 48' E. (depth?), and Algoa Bay, 155 metres (Thiele).

Algoa Bay, 67 fathoms, 4 dead specimens (S. Afr. Mus. A.8657, P.F. Coll.).

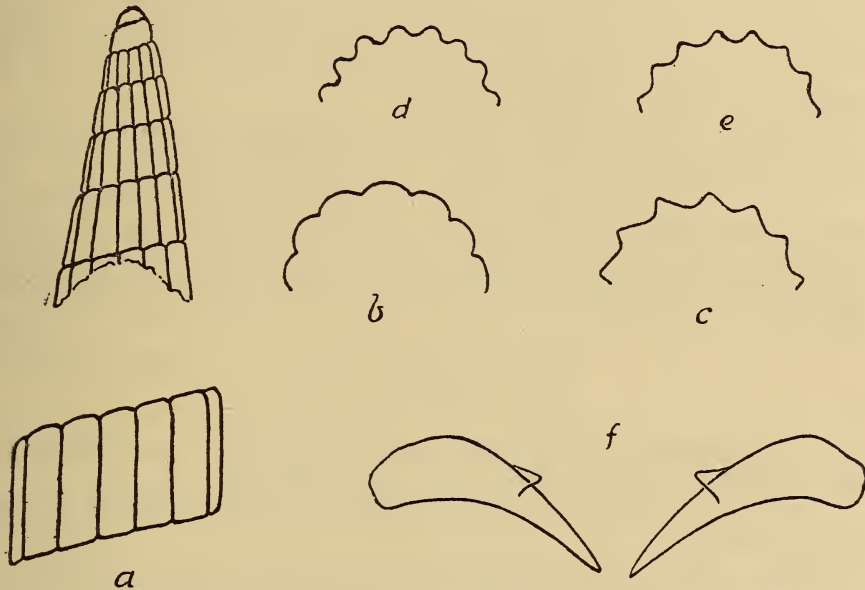


FIG. 1. *a*. *Terebra planecosta* n. sp. 5 mm. fragment above, one whorl of 9 mm. Type below. *b*, *c*, *d*, *e*. Diagrammatic cross-sections of *T. planecosta* n. sp., *lightfooti* Smith, *thielei* n. sp., and *capensis* Smith, respectively. *f*. One pair of teeth from radula of *Diplomeriza fictilis* (Hinds).

One specimen 5.25 × 2.25 mm., one 5.25 × 2 mm., one fragment 4 mm. long, one with 4 postnatal whorls 6.5 mm. long. All four appear to be conspecific, although the two complete specimens differ in proportionate width.

Thiele had one specimen from both of the above localities, and also a third from Gt. Fish Bay, Angola; but I am inclined to query the identity of the latter.

*Terebra planecosta* n. sp.

Fig. 1 *a*, *b*

Protoconch 2 whorls, smooth. Postnatal whorls 8, early whorls with 11 straight axial ribs, broad and flat, with narrow, shallow intervening grooves, increasing to 12 or 13 on later whorls; no spiral groove or spiral striae.

Type, protoconch plus 6 whorls 9 mm., another specimen consisting of the 3rd to 8th whorls 12.5 mm.; fragment protoconch and 5 whorls 5 mm.

Glossy, pale buff, a faint darker band on upper half of whorls.

Off Cove Rock (East London area),  $4\frac{1}{2}$  miles, 22 fathoms, one dead (Type, A8659); Cape St. Blaize, N.  $\times$  E., 73 miles, 125 fathoms, two broken specimens, A8658 (S. Afr. Mus. P.F. Coll.).

*Terebra kowiensis* Turton

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 11, pl. 2, no. 92.

The figure shows an 18 mm. shell with 6 whorls; nearly straight, broad axial ribs with narrow intervals, 7 on 2nd whorl, about 10 or 11 on last whorl; the photograph does not seem to have been retouched (as have some of Turton's photographs), so one may reckon there should be about 24 axial ribs on the complete circumference of the last whorl.

Such as it is, the description does not correspond: 7 whorls, and about 40 ribs on the last whorl. The number 40 is probably a misprint.

In having no spiral sculpture, Turton's shell has some resemblance to *thielei* and *planecosta*; to the former species in regard to the number of ribs, to the latter in regard to their (apparent) flatness and narrow intervals. But the *kowiensis* photograph shows a greater number of ribs, and an altogether larger shell.

*Diplomeriza fictilis* (Hinds)

Fig. 1 f

1845. Hinds in Sowerby. *Thes. Conch.*, i, p. 183, pl. 45, figs. 109, 110 (*Terebra f.*).

1928. Tomlin. *Ann. S. Afr. Mus.*, xxv, p. 329 (*Terebra f.*).

Protoconch  $1\frac{1}{2}$  (?2) whorls, alt. 0.2, diam. 0.25 mm., smooth (all specimens slightly corroded).

Three of the shells mentioned by Tomlin have been examined and found to possess a radula comprising 24 pairs of solid, slightly curved teeth. This species must therefore be removed from *Terebra* s.s.

In contrast with Thiele's (1929, *Handbuch*, i) figure 469 (after Troschel) of a radula tooth of *D. duplicata*, the denticle or flange is on the anterior margin in *fictilis*.

*Diplomeriza duplicata* (Linn.)

S. Afr. Mus. has examples obtained by P. Ross Frames from Fernão Veloso Bay, north of Mozambique Island. There is every probability that the species occurs farther south.

Fam. CONIDAE

1937. Tomlin. *Proc. Malac. Soc.*, xxii, pp. 205-330 (list of Recent and fossil species).

The following species have been recorded from South Africa (Cape and Natal), but their presence as living components of the fauna has yet to be confirmed: *aplustre*, *arachnoideus*, *bandanus*, *capitaneus*, *consors*, *conspersus*, *crotchii* (Saldanha Bay!), *eumitos* Tomlin 1926 (? = *panniculus*), *figulinus* (Durban: S. Afr.

Mus.), *geographus*, *gilvus* (Saldanha Bay!), *glans*, *gubernator*, *guttatus*, *lamarckii*, *legatus*, *lineatus*, *litteratus*, *namocanus*, *nimbosus*, *obscurus*, *pauperculus*, *plumbeus*, *primula*, *punctatus*, *quercinus*, *tulipa*.

The other species may be accepted as South African, subject to future research on synonymy (e.g. *elongatus-mozambicus* and *simplex*).

*Conus eucoronatus* Sow. (3rd)

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 217, pl. 3, fig. 9.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 354 (radula).

As the figure shows: the width '34' is a misprint for 24 mm.

The second specimen recorded from Natal by Sowerby was a dead example. A third example, also dead, 24 mm. long, was taken off Durnford Point (Zululand) in 90 fathoms; and a fragment with the distinctive sculpture, from off O'Neil Peak (Zululand), 90 fathoms. (S. Afr. Mus. P.F. Coll.)

The Type, now in S. Afr. Mus., was presumably a living specimen, the animal of which was extracted by Sowerby and sent to Gwatkin, because Peile records a Gwatkin slide of the radula (in Brit. Mus.). The radula teeth are similar to those of *aurora*. There is, however, no certainty that this radula belongs to *eucoronatus*.

*Conus papillaris* Ad. & Rve.

1848. Adams and Reeve. *Zool. H.M.S. 'Samarang' Moll.*, p. 17, pl. 5, figs. 7a, b (coloured).

1873. Sowerby. *Proc. Zool. Soc. Lond.*, p. 146, pl. 15, fig. 4 (coloured) (*altispiratus*).

Shoulder angular, with moderately numerous and prominent, slightly oblique knobs, spire high, turreted, angle 70°–80°, whorls above shoulder with axial lines of growth but no spiral striae. Periostracum thin, adherent. 49 × 23 mm.

Operculum narrow, ovate-cuneiform, margin entire, 5.5 × 1.75 mm. in 49 mm. shell.

Agulhas Bank (Sowerby, 2nd); False Bay, 18–23 fathoms (S. Afr. Mus. P.F. Coll.).

Although described in the *Samarang* Report, the type specimen of *papillaris* was taken during Sir Edward Belcher's previous voyage in H.M.S. *Sulphur*. No note of its locality was attached to it. Nevertheless there is no improbability in its having been dredged on the Agulhas Bank, together with several other molluscs which were described by Hinds in the *Sulphur* Report. This is supported by the almost exact resemblance of the largest S. Afr. Mus. specimen to Adams & Reeve's figure; it is slightly larger (if the figure of *papillaris* is natural size: 42 mm.), and not so strongly coronate, but otherwise might well have posed for the original illustration.

Moreover, although Sowerby (3rd) identified this one specimen as his father's *altispiratus*, he identified other P.F. specimens from the Agulhas Bank



as *papillaris*, without however recording them in print. These latter, being non-coronate, I regard as *gradatulus* (q.v.).

At first sight there is more resemblance between the figures of *turritus* Sow. 1870 and *papillaris* than between those of *altispiratus* and *papillaris*; and Sowerby (1870. *Proc. Zool. Soc. Lond.*, p. 256) said that *turritus* was slightly suggestive of *papillaris* but was non-coronate. Sowerby's description of *altispiratus* does not mention the shoulder knobs, but his figure shows them. (His comparison with *franciscanus* seems inexplicable because the latter is quite different in shape.)

Possibly this is a case of a species having coronate and non-coronate forms, analogous to that suspected in *lividus-flavidus*. In *C. semisulcatus* Sow. the early whorls are coronate, the later ones non-coronate. See *Illustr. Zool. R.I.M.S.* 'Investigator' Moll., pl. 14, figs. 1, 1a, 1907; also Smith's remarks on *C. aculeiformis* Rve. in *Ann. Mag. Nat. Hist.* (7), xiii, p. 455, 1904.

The largest specimen was taken alive, and retains the operculum; Sowerby probably retained the animal. Another specimen, 40 (protoconch missing) × 18 mm., with shoulder and spire slightly worn and corroded, closely resembles the figure of *altispiratus*.

Five dead juveniles from Still Bay (S. Afr. Mus. Muir Coll.) are coronate and may perhaps be this species; but the early whorls have 2-3 spiral striae above the shoulder, and there are no connecting stages.

*Conus imperialis* Lam.

1906. Smith. *Ann. Natal Mus.*, i, p. 22, pl. 7, fig. 1 (*queketti*).

In spite of Smith saying 'a very distinct species and not comparable with any of the known forms', I venture to suggest that *queketti* is synonymous with *imperialis*.

S. Afr. Mus. has examples of *imperialis* from Mozambique Island (Ross Frames Coll.), and Diego Garcia.

*Conus ebraeus* Linn.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352, fig. 16 (radula).

Living examples known from: Scottburgh (Natal) (S. Afr. Mus. Coll. Burnup); Port St. Johns and Umgazana (Pondoland), Umtwalumi (Natal) (U.C.T.); Delagoa Bay (U.W.).

Peile says the radula teeth have neither barb, blade, nor serrations.

*Conus arenatus* Brug.

1929. Thiele. *Handbuch*, i, fig. 463 (radula).

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352, fig. 24 (radula).

Living: Durban (S. Afr. Mus. Coll. Burnup); Delagoa Bay (U.W.).

The radula tooth of the Delagoa Bay specimen conforms with Peile's figure.

*Conus ceylanensis* Brug.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352 (radula).

Living: Scottburgh (Natal) (S. Afr. Mus. Coll. Burnup); Delagoa Bay (U.W.).

One of the Scottburgh specimens is subscalariform.

*Conus miliaris* Brug.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352 (radula).

Living: Scottburgh (Natal) (S. Afr. Mus. Coll. Burnup); Delagoa Bay (U.W.).

*Conus minimus* Linn.

Living: Isipingo, Natal (S. Afr. Mus. Coll. Burnup); Delagoa Bay (U.W.); Durban Bay, and a dead but fresh specimen from Umgazana, south of Port St. Johns (U.C.T.).

*Conus zeylanicus* Gmelin

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352, fig. 25 (radula).

Living: Durban (S. Afr. Mus. Coll. Burnup).

*Conus lividus* Brug.

Fig. 2 g

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352, fig. 15 (radula).

Living: Scottburgh (S. Afr. Mus. Coll. Burnup); Isipingo and Durban (U.C.T.); Delagoa Bay (K.H.B., also U.W.).

The radula of a Delagoa Bay specimen is not long-shafted, has a barb, a narrow blade, and serrations extending to nearly midway on the shaft. This is in conflict with Peile's description and figure of a Seychelles specimen.

*Conus flavidus* Lam.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352 (radula).

1952. Braga. *Anais J. Invest. Ultramar.*, vii, 3, p. 70, pl. 1, fig. 8.

It has been suggested that this is the non-coronate form of *lividus*. The spiral striae on the whorls of the spire do not seem to be nearly so well marked as in *lividus*.

*Conus textile* Linn.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 350, fig. 9 (radula).

Living: Delagoa Bay (U.W.).

*Conus betulinus* Linn.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352, fig. 21 (radula).

1952. Braga. *Anais J. Invest. Ultramar.*, vii, 3, p. 69, pl. 1, fig. 9.

Living: Delagoa Bay (U.W.).

*Conus miles* Linn.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 354, fig. 26 (radula).

S. Afr. Mus. P.F. Coll. has a specimen retaining its periostracum, without precise locality.

*Conus catus* Brug.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 349 (radula).

Living: Scottburgh (S. Afr. Mus. Coll. Burnup).

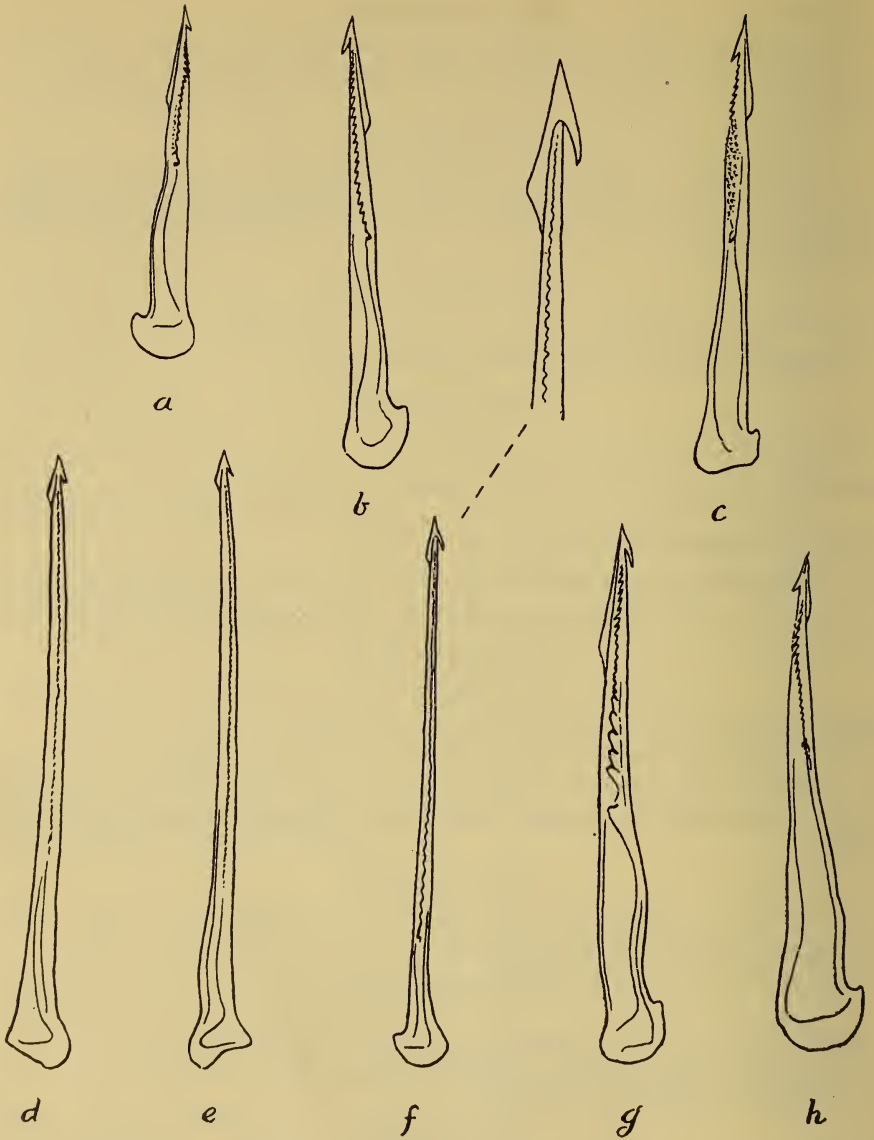


FIG. 2. Radula teeth of *Conus*. *a. infrenatus*, *b. aurora*, *c. elongatus*, *d. gilchristi*, *e. natalis*, *f. vexillum*, *g. lividus*, *h. gradatulus*, *d, e.* copies of drawings by H. Watson of teeth in his collection, mounted by Gwatkin; the mount of *gilchristi* is labelled [received from] 'Sowerby 1903'.

*Conus rattus* Brug.

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 351 (radula).

Living: Scottburgh (S. Afr. Mus. Coll. Burnup).



*Conus vexillum* Gmelin

## Fig. 2 f

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 350, fig. 13 (radula).

Living: Off Cape St. Lucia (Zululand), 27 metres. 2 specimens (s.s. *Africana*, 15/5/48).

Shell thick, angle of spire  $110^{\circ}$ . Yellowish or pinkish, pale band around middle, darker band above and below; 2-3 narrow dark bands near shoulder, spire mottled; periostracum pale brown. Operculum narrow, margin entire.  $56 \times 28$  mm.

Radula tooth with slender elongate shaft, small barb, bevelled blade, and serrations extending  $4/5$  length of shaft, ending in an obscure spur.

These specimens seem referable to this species as they are narrower than typical *namocanus*, and the brown spiral lines characteristic of the latter are absent.

*Conus tessulatus* Born

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352, fig. 23 (radula).

Living: Delagoa Bay (U.W.).

The radula tooth of this specimen agrees with Peile's figure.

*Conus piperatus* Dillwyn

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 352, fig. 20 (radula).

Living: Scottburgh (S. Afr. Mus. Coll. Burnup).

*Conus infrenatus* Rve.

## Fig. 2 a

1848. Reeve. *Conch. Icon. Suppl.*, pl. 3, sp. 285.

1889. Sowerby. *J. Conch.*, vi, p. 9, pl. 1, fig. 12 (*bairstowi*).

The S. Afr. Mus. series shows transition from the typical *infrenatus*, with numerous spots, the more prominent of which are arranged in at least 10 spiral series, 2 series in the middle usually enclosing a darker brown band; to *bairstowi* with pale unspotted ground-colour and only 6 well-spaced series of brown spots.

Living: Algoa Bay (U.C.T. *infrenatus*; and S. Afr. Mus. P.F. Coll.: *bairstowi*).

A radula of a typical *infrenatus* has 15 pairs of teeth, barb very fine, blade very narrow and inconspicuous, serrations extending not quite to midway on shaft ( $3/7$ ), ending in a small spur.

*Conus gilchristi* Sow. (3rd)

## Plate II and fig. 2 d

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 348 (radula).

Spire low, angle  $130^{\circ}$ .  $52 \times 27$  mm.

The Type and only known specimen, now in S. Afr. Mus., was taken alive. The animal was presumably passed to Gwatkin, and, again presumably, it was a Gwatkin slide which Peile examined.

There exists another mounted tooth presented by Gwatkin to my friend H. Watson, Cambridge (in litt. 5/4/57). Shaft slender elongate (Watson: 3.65 mm.), barb small, blade short and bevelled, minute serrations extending at least to midway along shaft.

*Conus natalis* Sow. (2nd)

Plate II and fig. 2 e

Laps. cal. *natalensis* Sow. (3rd).

The shape varies: slender forms, somewhat elliptical in outline, with flatly rounded shoulder and rather high spire, angle  $90^\circ$  (fresh) to  $105^\circ$  or  $110^\circ$  (worn); plump forms, with more prominent shoulder and low spire, angle  $120^\circ$ – $130^\circ$  (or  $135^\circ$  worn).

Radula of a Port Shepstone specimen collected by Burnup, in coll. Watson, Cambridge: shaft 3.65 mm. long, similar to that of *gilchristi* (*supra*).

The most south-westerly locality for beach-worn specimens seems to be the Kowie (Port Alfred), whence S. Afr. Mus. has one example with the *gilchristi* pattern.

Placed side by side, a typical *natalis* would appear to be a species quite distinct from *gilchristi*. But the S. Afr. Mus. series indicates that they are only forms of one variable species. The accompanying photograph (Plate II) of a few specimens selected from the series demonstrates the variation in form (allowance being made for some examples which are beach-worn) and colour-pattern. The third shell from the right in the lower row has the *gilchristi* shape with the *natalis* pattern. The radula teeth are the same in the two forms.

The *Pieter Faure* obtained no specimens, dead or alive, of *natalis*. This may indicate that the *natalis* form is found in the littoral zone or very shallow water, while *gilchristi* is a deeper water form. It must, however, be borne in mind that trawling close inshore on the Natal coast is difficult; except at two or three places, e.g. Tugela River mouth, the *Pieter Faure* did scarcely any trawling within the 25-fathom contour.

A transition in colour pattern from *natalis* to *infrenatus* is almost possible, except that the latter is 'dotted' and never has the slightest trace of triangular or arrow-head markings. Moreover the radulae are quite different.

Burnup, with whom I discussed (1914) the matter, agreed that on the available evidence *gilchristi* should be regarded as a synonym of *natalis*. For the time being, however, I retain them here as two species.

*Conus pictus* Rve.

1843. Reeve. *Conch. Icon.*, i, pl. 18, sp. 98.

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 14.

1937. Tomlin. *Proc. Mal. Soc.*, xxii, p. 291.

Pale buff or rosaceous, sometimes with faint darker spots, two paler bands, varying in width, articulated with darker spots or angular axial streaks, a third similar band at the anterior end, spire with irregular flames.  $36 \times 20$  mm.

Six specimens received from the Albany Museum, Grahamstown, probably collected by Dr. H. Becker at the Kowie (Port Alfred), and labelled *pictus* Rve. This identification has been confirmed by A. E. Salisbury (1956). The shells are very like *beckeri* Sow. (1911), which both Tomlin (1937, loc. cit.) and Salisbury consider as a variety of *aurora*.

Bartsch recorded it (presumably dead) from Port Alfred and Gt. Fish River mouth.

A dead but fresh specimen was dredged in Algoa Bay (U.C.T.).

*Conus scitulus* Rve.

1848. Kiener. *Coq. viv.*, p. 218, pl. 55, fig. 4 (*iaspideus*, non Gmelin).  
 1848. Krauss. *Südafr. Moll.*, p. 131 (*jaspideus* Kien. non Gmelin).  
 1849. Reeve. *Conch. Icon. Suppl.*, pl. 9, sp. 283.  
 1858. Crosse. *Mag. Zool.* (2), x, p. 122 (*danieli*, nom. nov. for *jaspideus* Kien.).  
 1903. Smith. *Proc. Mal. Soc.*, v, p. 362.  
 1937. Tomlin. *ibid.*, xxii, pp. 237, 263, 306.

Angle of spire  $90^\circ$ . A continuous reddish or orange-brown band below the shoulder, the rest of the whorl mottled orange on white ground, the mottling denser on base, spire with brown marks between white patches which latter are more or less lobate, descending to or very slightly over the shoulder (but not nearly so far as in *simplex*).  $23 \times 12$  mm.

Algoa Bay (Kiener); Cape (Krauss, Smith); Hermanus (S. Afr. Mus.).

The worn Hermanus specimens were identified by J. H. Ponsonby, and recently (1956) confirmed by A. E. Salisbury.

The white patches around the shoulder give the species a strong resemblance to *simplex*.

*Conus gradatulus* Weink.

Fig. 2 h

1870. Sowerby. *Proc. Zool. Soc. Lond.*, p. 256, pl. 22, fig. 14 (coloured) (*turritus*, non Lam., fossil).  
 1875. Weinkauff in *Mart. Chemn.*, p. 356, pl. 66, fig. 15 (copy).  
 1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 22.

Spire high, turreted, angle  $70^\circ$ – $90^\circ$ , shoulder angular, non-coronate; operculum narrow oval, margin entire; periostracum thin, fimbriate around the shoulders, adherent. Up to  $54 \times 24$  mm.

Creamy-white, with faint indications of 3 fulvous bands, one below shoulder, one in middle and one between latter and base, aperture within faintly pink, periostracum pale buff or yellowish.

Radula tooth rather slender in distal two-thirds, barb small, blade very narrow, serrations extending about one-third length of shaft, no spur.

Agulhas Bank (Sowerby, von Martens).

Living: on Agulhas Bank from approx 27° E. to around Cape Point and off west coast of Cape Peninsula as far north as approx. latitude of Cape Town, 44–256 fathoms (S. Afr. Mus. P.F. Coll.).

Recorded also from Gt. Fish Bay, Angola, by von Martens.

*Conus patens* Sow. (3rd)

1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 351 (radula).

Spire rather low, angle 105° (Type) to 110° (another specimen). Shoulder rounded-angular; operculum oval, margin entire; periostracum rather thick and rough.

According to Peile the radula teeth are similar to those of *vexillum*. Presumably the radula he examined was in the Gwatkin collection in the Brit. Mus. and derived from the animal of the unique Type shell.

Type in S. Afr. Mus. In the P.F. collection there is a smaller specimen, 36 mm. long, from off west coast of Cape Peninsula, 156 fathoms, identified by Sowerby. With this identification I agree. But Sowerby also identified several other specimens as *patens*, which I refer to *gradatulus* on account of their high spires. A curious feature confirms this: the thickish periostracum of both the Type and the smaller specimen of *patens* flakes off in patches, whereas the thin periostracum of *gradatulus* (and also *papillaris*) adheres closely to the shell.

*Conus simplex* Sow. (2nd)

1843. Reeve. *Conch. Icon.*, pl. 5, sp. 24 (*informis*, non Brug.).

1857/8. Sowerby. *Thes. Conch.*, iii, p. 31, pl. 9 (195), fig. 199.

1903. Smith. *Proc. Mal. Soc.*, v, p. 362 (quotes 'Thes. iii').

1937. Tomlin. *ibid.*, xxii, p. 308 (quotes 'Thes. ii').

Spire high, angle 90°. Operculum oval, margin entire. Up to 54 × 24 mm.

Brown with a series of white irregular spots around middle and a series of crescentic or zigzag white marks in basal half, shoulder with white *lobate* blotches; or the white predominating as ground-colour, the brown forming zigzag axial streaks or flames. Animal dark grey.

Radula with 18–19 pairs of teeth which are similar to those of *elongatus* (q.v.).

Living: False Bay, 0–11 fathoms (S. Afr. Mus. P.F. Coll., also U.C.T.).

Recorded from East Indies by Sowerby. S. Afr. Mus. has two specimens from Mauritius.

The conspicuous white lobate patches around the shoulder are a distinctive feature, though somewhat similar but smaller patches occur in *scitulus*.

*Conus elongatus* Chemn.

Fig. 2 c

? Chemnitz. *Conch.*, x, pl. 144A, figs. i & k (quoted from Lamarck, 1810).

1798. Lamarck. *Tabl. Encycl.*, pl. 337, figs. 1, 2 (*mozambicus* Brug.).

1810. *id.* *Ann. Mus. Paris*, xv, p. 281 (*mozambicus* Brug.).



1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 13, pl. 1, fig. 12 (*alfredensis*).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 12, pl. 3, no. 97 (juv. subscalariform).  
 1937. Tomlin. *Proc. Mal. Soc.*, xxii, pp. 210, 244, 278.

Protoconch  $1\frac{1}{2}$ –2 whorls, diam. 1.5 mm. In young shells with 1, 2 or 3 (sometimes 4) whorls spiral striae cover the whole whorl, but in older shells are confined to the base. Elongate, shoulder flatly rounded, spire high, angle  $c.$   $85^{\circ}$ ; operculum oval, margin entire. Up to  $70 \times 31$  mm. (S. Afr. Mus. worn),  $68 \times 33$  mm. (U.C.T. living).

Variable brown mottling on white ground colour, sometimes nearly continuous around body whorl, sometimes broken up into axial zigzags and flames, often a predominantly white spiral band around middle, sometimes spiral series of small brown rectangular spots; shoulder irregularly brown and white; inside of aperture faintly violaceous; periostracum yellow-brown, in fresh specimens almost concealing the shell pattern. Animal (as preserved) blackish.

Radula with 14–15 pairs of teeth, with barb, narrow blade, serrations extending to about midway along shaft, ending in a spur; the proximal part of the serrated ridge is bordered with minute scabrosities.

Living (or in fresh condition): Still Bay, Danger Point, Hermanus, False Bay, west coast of Cape Peninsula, Dassen Island, Langebaan (Saldanha Bay), Hondeklip Bay, Port Nolloth (S. Afr. Mus. and U.C.T.).

Recorded (dead) from Port Alfred and Port Elizabeth.

The *Pieter Faure* obtained the large 70 mm. worn specimen from 130 fathoms off the west coast of the Cape Peninsula.

*C. alfredensis* Bartsch. seems to me synonymous. Tomlin (1937, p. 210) makes it a synonym of *aurora*; but perhaps the words '=*aurora*' were intended to be inserted in the next entry, namely *algoensis*. The shape of *alfredensis* is more like that of *elongatus* than of *aurora*.

S. Afr. Mus. has a subscalariform example  $40 \times 17$  mm. from Hermanus. cf. Turton's juv.  $12 \times 5.5$  mm. from Port Alfred.

Tomlin in his 1937 list of Cones does not mention an *elongatus* of *Chemnitz*.

The identity of *mozambicus* and *elongatus*, or its occurrence on the east coast of Africa, has not yet been confirmed, so far as I am aware.

*Conus aurora* Lam.

Fig. 2 b

1939. Peile. *Proc. Mal. Soc.*, xxii, p. 352, fig. 19 (radula).

This common species has numerous synonyms: *algoensis*, *tinianus*, *caffer*, *loveni*, *secutor*, *fulvus*, *beckeri*, *lavendulus*, *kraussi*.

Shoulder rounded, spire moderate, angle  $105^{\circ}$ – $115^{\circ}$ . Up to  $65 \times 33$  mm.

Colour and pattern very variable, ranging from almost uniform rose (*aurora*) and fulvous or chocolate (*algoensis*, *fulvus*) to the variously speckled, lined, and banded forms (*loveni*, *lavendulus*). The rose, lavender, or mauve coloration seems to be due, at least to some extent, to beach wear and weathering.

One specimen in S. Afr. Mus. has mauve ground colour on one side (*lavendulus*) and orange-pink on the other (*aurora*).

Radula with 14 pairs of teeth, 0.9–1 mm. long in a 35 mm. shell, with barb, narrow but rather long blade bevelled off, serrations extending to midway along shaft, ending in a small spur. Confirmed by a radula in coll. H. Watson, Cambridge (in litt. 5 Apr. 1957) with teeth 0.65 mm. long. Peile describes a tooth 0.5 mm. long with the serrations not extending beyond the blade.

Living: Richmond (Alexandria Division), and Still Bay (U.C.T.); Peile's and Watson's specimens of radulae from Algoa Bay examples.

Records of dead examples: from Tongaat (30 miles north of Durban) to Still Bay (S. Afr. Mus.).

Bartsch records an *algoensis* collected by the U.S. North Pacific Exploring Expedition in False Bay; this is probably an error because S. Afr. Mus. has no records of localities west of Still Bay, and U.C.T. has not found this species in False Bay.

The *Pieter Faure* obtained no examples in the course of all her trawling in Algoa Bay and on the Agulhas Bank.

There are plump and slender forms (cf. *loveni* and *caffer*). Sowerby figured a subscalariform *beckeri*, and Turton's No. 97 may be either *aurora* or *elongatus*. S. Afr. Mus. has a subscalariform example of the ornate variety mentioned below. This slipping of the body whorl away from the preceding whorl is particularly well shown in one freak specimen, 54 × 33 mm., which in addition has two bulbous expansions on the shoulder, the last one causing a wide bulge on the outer lip.

S. Afr. Mus. has several examples of a particularly ornate colour variety, unfortunately without precise locality: red-brown, nearly uniform or mottled to a varying extent with white, either irregular patches or axial zigzags, always a white band a little below the middle, with dark red-brown patches or zigzags, base with brown and white patches; sometimes faint spiral interrupted dark lines above and below the middle band; the latter is constant, though the relative amounts of brown and white vary.

#### Fam. *TURRITIDAE*

1929. Thiele. *Handbuch*, i, pp. 357–72 (*Conidae* part).

Thiele's *Conidae* embraced three subfamilies of 'Pleurotomids' and a fourth: the true Cones. The distinctive facies of the shell of the latter seems to require them to be kept in a separate family.

The family *Turritidae* is well represented in the South African region, especially by 'species' founded on beach-worn shells. The animals of most of them are unknown, and the species have been assigned to various genera on account of the similarity of the shells to typical representatives of these genera. Examination of radulae, however, has shown that some species, e.g. *Clavatula*

*tumida*, *Pleurotoma* (*Drillia*) *scitecostata* and *fultoni*, have been assigned to entirely wrong genera (or even subfamilies).

For these reasons in the present work a fourth category has been added to Thiele's three subfamilies: *Species incertae sedis*. In most cases, maybe, conchologists have been guessing correctly in which genus to put a species, but until the animals have been examined we do not *know* the correct genus.

This fourth category is merely a temporary dumping-ground for 'conchological species'. It contains the great majority of the South African species, and indicates the pressing need for collecting living examples, especially of the littoral and inshore species. In some cases a species occurring in South Africa but well known from another region (e.g. *Turris cingulifera*) has been assumed to have been assigned to its correct genus in order to facilitate comparison with the shells of closely allied species.

The lateral plate of the radula of *Clavatula* and *Turris* seems to need investigation.

Thiele (1903. *D. Tiefsee Exp.*, vii, p. 173, pl. 9(4), fig. 7. *Pleurotoma* (= *Turris*) describes the lateral plate as 'slipper'-shaped, i.e. resembling a picture of a slipper in *one plane*. He does not suggest the plate is actually slipper-like, i.e. a hollow cone, sharply pointed at one end, obliquely truncate at the other end. In *C. sinuata* the plate is a solid 3-sided pyramid with the basal half obliquely sheared off. Associated with the plate is a thin oval lamella ('wing': Thiele). Is this lamella attached to the plate at the distal end of the bevelled portion? Is it an actual appendage ('Anhang': Thiele, 1925. *D. Tiefsee Exp.*, xvii, p. 206; and 1929. *Handbuch*, i, p. 357)?

Thiele's figures 13 and 14 (1925. loc. cit.) show it as such; but figure 13 (*sinuata*) is certainly incorrectly drawn. In arranging a radula on a slide, this lamella can easily be displaced, and is then seen to have no point of attachment, being rounded at both ends, sometimes more narrowly rounded or subacute at the inner or median end.

If the lamella is not attached, the further question arises: does it lie inside the bevelled portion of the plate or outside? By manipulation of the radula during mounting, I am inclined to adopt the latter view. If this is correct, cannot this lamella be regarded as a degenerate 2nd lateral or a marginal plate? Or, following Cooke (1895. *Cambr. Nat. Hist.*, iii, pp. 218, 219) the lamella is the degenerate lateral, the conical plate the marginal or uncinus (in either case, formula 1.1.1.1.1).

In *indica*, *gilchristi*, and *lobata* I have not succeeded in separating an accessory (or concomitant) lamella from a 'lateral' plate; in fact I doubt whether there is any accessory lamella.

The distal half of the plate is conical, possibly triquetral at the apex; the proximal half is a flat 'handle', which is about half the thickness of the conical part in side view, but as broad as the latter in face view. In side view an accessory lamella often appears to be present, but in face view this appearance is seen to be due to the sides of the 'handle' curving upwards (and slightly inwards).



Thus the proximal half of the plate appears to be a hollow half-cylinder, the distal half a solid cone.

The forked appearance seen in some preparations in more or less face view (fig. 3 *g, h* and cf. Thiele, 1925. figs. 17, 19) is due to the transmitted light having to penetrate a greater thickness of 'chitin', the flanges being seen in edge-view.

The above suggestions should be investigated by section-cutting and more refined methods of preparation than are available to me.

Subfam. TURRINAE Thiele (? emend: TURRITINAE)

Gen. DRILLIA Gray

Of the numerous South African species hitherto assigned to this genus I have been able to examine the animals of only four: *stolida*, *grayi*, *scitecostata*, *fultoni*. As a result one goes into a different genus and three into a different subfamily.

*Drillia falsa* n. sp.

Figs. 3 *a, 4 a*

Spire subtending an angle of *c.* 30°. Aperture 1½ in spire. Protoconch 2 whorls, diam. 1, alt. 0.75 mm., smooth. Postnatal whorls 5. Axial ribs 10 on 1st whorl, 9 on each of the others, oblique, protractive, narrower than intervals, not crossing sulcus, and petering out on base of last whorl. Growth-lines well marked. No spiral striae on whorls and only 3-4 very faint striae near extremity of base. Sulcus wide; lip sinus deep. Canal short. 9.5 × 3.75 mm. Operculum oval, nucleus apical. Pale fawn, operculum amber.

Radula with 34 rows, central plate narrow, lateral (intermediate) with 10-11 denticles, marginal with a small rounded lobe on postero-external corner.

False Bay (Tra. 139. s.s. *Africana* per U.C.T.).

*Remarks.* Thiele's species *ancilla* was 4.75 mm. long, with 4 whorls, diam. protoconch 0.55 mm. (in figure), and, judging by the figure, the lip sinus was already developed; the present specimen agrees with the characters given by Thiele, except the ribs do not cross the sulcus; but it is a larger species with distinctly larger protoconch.

Resembles *hottentota* in having no spiral sculpture, but seems to be a smaller species with more prominent shoulder and consequently more convex profile, and fewer axial ribs.

*Clavatula taxus* Chemn.

Figs. 3 *b, 4 b*

1923. Odhner. *Med. Göteborg. Mus.*, xxiii, p. 7 (*taxus*, and *bimarginata* non Lam.).

1926. Tomlin. *Ann. Natal Mus.*, v, p. 289 (*bimarginata*, apud Odhner).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 18, and var. *affinis*, p. 18, pl. 3, no. 142.

1932. id. *ibid.*, p. 18, pl. 4, no. 144 (*rufanensis*).





FIG. 3. Radula teeth of: *a. Drillia falsa* n. sp., central, lateral and marginal. *b. Clavatulax taxus* Chemn. central and lateral. *c. C. gravis* (Hinds), three centrals and laterals, showing 'accessory lamellae' displaced while arranging radula on slide for mounting. *d. C. sinuata* Born., central and lateral, face and edge views of latter. *e. Turris stolidus* (Hinds), lateral. *f. T. saldanhae* n. sp., lateral. *g. T. indica* Bolten, face and edge views. *h. T. gilchristi* (Sow.), face and edge views. *i. T. lobata* (Sow.), from lobate East London specimen. *j.* from Cape Point specimen.

Protoconch 2 whorls, diam. 1.3 mm., smooth. Postnatal whorls 10. Oblique ridges above suture usually distinct in early whorls, obsolete in later whorls. Fine spiral striae. Cingulum usually prominently tumid, sometimes, chiefly in early whorls, feebly nodulose, and demarcated by a slight groove from the smooth area of sulcus, which is narrower than cingulum. Lip sinus narrow and very deep. 87 (without protoconch)  $\times$  29 mm. Up to 100 mm. (Turton).

Operculum oval, nucleus nearly at middle of inner margin, which is thickened or duplicated on outer surface; 16  $\times$  5.5 mm. in a shell 48 mm. long.

Periostracum yellowish-brown, dark chestnut-brown, or blackish brown. Animal (as preserved) dull reddish-brown.

Radula with 42-50 rows, central plate small, narrow, with median cusp, lateral plate with wing-like appendage.

Off Cape Barracouta, 40 fathoms (Odhner); St. Sebastian Bay, 40 fathoms (coll. K.H.B.); off East London, and Algoa Bay to off Cape St. Blaize, 19-52 fathoms (S. Afr. Mus. P.F. Coll.); Simon's Bay (dredged) (S. Afr. Mus.); False Bay (U.C.T.).

*Remarks.* Odhner's 'bimarginata' was 25 mm. long. The Simon's Bay example (identified as *bimarginata* by J. H. Ponsonby) is 32 mm. long, and

obviously a young *taxus*. There are two smaller examples, 21 and 15 mm., which show the oblique nodules and the spiral striae very clearly.

Juveniles of *taxus* and *gravis* may be liable to confusion; *taxus* has a slightly larger protoconch.

I have seen one example of the West African *bimarginata* Lam. (35 mm., from Goree). It has the whole base of the body whorl below shoulder with strong spiral lirae which completely obliterate the oblique axial ribs, reducing these to knobs on the shoulder; and the curve of the growth-lines on the sulcus is unsymmetrical, almost horizontally retractive below the cingulum and obliquely protractive above the shoulder knobs.

Melville (1917. *Proc. Mal. Soc.*, xii, p. 165), quoting Reeve, says that the salmon-pink hue of this species (*bimarginata*) is unique in the genus. Presumably that applies to the cleaned shell, because the periostracum in the above specimen is dark chestnut or umber-brown.

There are broad and narrow individuals, e.g. 45 × 17 mm., 44 × 15 mm. and 48 × 18 mm. (the latter two taken in the same haul) (width across shoulder, excl. aperture).

I consider *rufanensis* Turton a young worn example of *taxus*.

*Clavatula impages* (Ad. & Rve.)

1848. Adams and Reeve. 'Samarang', p. 39, pl. 9, fig. 1 (*Pleurotoma i.*).

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 23 (*Clionella impages*, non Ad. & Rve.).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 18 (*impages* ?).

First recorded in South Africa by von Martens from 35° 16' S., 22° 26' E., 155 metres, and from Port Elizabeth (dead).

One of these specimens was stated by E. A. Smith to be similar to the type of *impages*. Von Martens doubted the locality 'China Sea' given by Adams and Reeve, because of the likeness to *taxus*, and the restriction of the genus *Clionella* to South Africa (the latter not at all a conclusive reason!).

Turton said he saw specimens at the British Museum labelled *taxus* var.

Both von Martens and Turton record their specimens as being narrower than *taxus*. The S. Afr. Mus. series, short as it is, shows that this is not a specific character. Moreover the original figure of *impages* shows none of the features characteristic of *taxus*.

I propose therefore to delete *impages* Lam. from the South African faunalist, and to add the recorded localities to those of *taxus*.

*Clavatula gravis* (Hinds)

Figs. 3 c, 4 c

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 229.

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 23.

1925. Thiele. *ibid.*, xvii, p. 213, pl. 35(23), fig. 12.

[Not Turton. 1932. p. 19, pl. 4, no. 146=very worn *tumida*.]

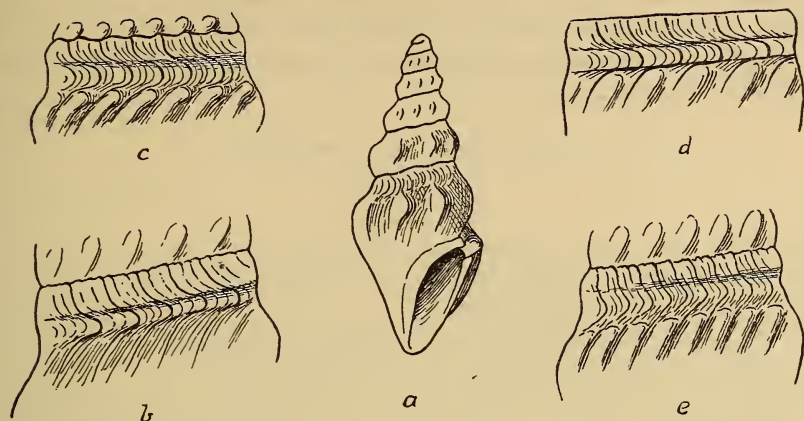


FIG. 4. a. *Drillia falsa* n. sp. b. *Clavatula taxus* Chemn. c. *C. gravis* (Hinds). d. *tripartita* Weink. e. '*Clavatula*' *tumida* (Sow.). b-e. semidiagrammatic to show shape of lip sinus.

Protoconch 2 whorls, diam. 1 mm., smooth. Postnatal whorls 8-9. Fine spiral striae on all whorls, somewhat variable in strength. Nodules above shoulder appear subcircular to naked eye but slightly oblique under a lens; suture runs close below these nodules, sometimes encroaching on them, but never completely absorbing or concealing them (cf. Thiele's figure). Tumid cingulum below suture may be more prominent than the nodules above, and may itself be slightly nodulose, but is never demarcated by a groove from the smooth area of the sulcus, which is broader than the cingulum; lip sinus broad and rather deep. On last whorl the nodules extend basally as oblique ridges, sometimes with an additional ridge or a series of feeble nodules below the shoulder (cf. Thiele's figure). Up to 45 mm. long.

Operculum oval, nucleus at middle of inner margin, which is thickened;  $5 \times 2.75$  mm. in shell 23 mm. long.

Cream under the pale buff periostracum, with faint indications of slightly darker marks, end of rostrum pinkish-brown; operculum amber.

Radula with 50 rows (23 mm. shell), central plate small, narrow, acicular, lateral with wing-like appendage.

Cape Agulhas, 43 fathoms (Hinds); Agulhas Bank, 47 and 17 fathoms (Sowerby); St. Francis Bay, 80-100 metres (von Martens); off Durnford Point (Zululand), 13 fathoms; off Umhloti and Umkomaas Rivers (Natal), 27 fathoms and 40 fathoms; off East London, 45 fathoms, and Algoa Bay to False Bay, 10-47 fathoms (S. Afr. Mus. P.F. Coll., all dead but fresh).  $35^{\circ}$  S.,  $20^{\circ} 49'$  E., 91 metres, 1 dead, 1 living (s.s. *Africana*). False Bay and Mossel Bay, living (U.C.T.).

Reported from the estuary of the Congo (Dautzenberg. 1912. *Ann. Inst. Océan.*, 5, fasc. 3, p. 10). The identification should be checked.



*Remarks.* The 'bead-necklace' appearance, caused by the nodules above and the cingulum below the suture, is distinctive. The absence of a groove between cingulum and sulcus distinguishes this species, especially in the case of juveniles, from *taxus*.

*Clavatula (Melatoma) sinuata* Born

Figs. 3 d, 5 a

1877. Smith. *Ann. Mag. Nat. Hist.* (4), xix, p. 499 (*bornii*).  
 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 17, pl. 2, fig. 2 (*turtoni*).  
 1915. id. *ibid.*, p. 18 (*sinuata* and *bornii*).  
 1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 204, fig. 13 (*radula*).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 17, pl. 3, no. 137.

Length of aperture  $1\frac{1}{2}$ –2 times in spire. Protoconch ? Postnatal whorls 8 (?9). Oblique ribs 11–12 on early whorls, increasing to 15–16 on later whorls, sometimes 18 on body whorl of large specimens, extending to or almost to canal. Suture undulate, embracing lower ends of ribs; a slightly nodulose cingulum below suture; sulcus shallow; outer lip with narrow and rather deep sinus, which at the formation of each successive rib produces a *nodule slightly more prominent than the rib below it*. Growth-lines across sulcus only slightly oblique to the suture. Spiral striae (when present) numerous, inconspicuous, best seen on early whorls. Up to 60 mm. long.

Operculum oval, nucleus in middle of inner margin, which is duplicated on outer surface;  $8 \times 4$  mm. in shell 25 mm.,  $10 \times 5$  in shell 40 mm.

Brown, with dark brown or blackish periostracum; or pale brown with yellowish-brown periostracum (*bornii*, *turtoni*).

Radula with 50–60 rows, central plate small, squarish, with median cusp, lateral rather slender, with wing-like appendage.

Port Alfred, Hermanus, False Bay, west coast of Cape Peninsula, Saldanha Bay, and northwards to Buffelsrivier (S. Afr. Mus. and U.C.T.). Recorded also from Natal by Krauss.

Littoral and shallow inshore waters. Not obtained in any of the *Pieter Faure* dredgings.

The pale form occurs together with the typical dark form at Port Alfred, but at the Cape only the latter.

*Remarks.* The lip sinus, not being in the concavity of the sulcus but forming a series of raised nodules corresponding with the ribs, is distinctive; in slightly worn examples these abraded nodules form a series of white beads separated by grooves in which the dark periostracum persists.

The apex and early whorls are much subject to corrosion, so that the normal number of whorls is uncertain. I have seen no specimen with its protoconch.

There are plump and slender individuals, e.g.  $35 \times 14$ ,  $43 \times 14$ ,  $45 \times 12$ , and  $50 \times 15$  mm.



One specimen, 25 mm., from Saldanha Bay (U.C.T.), has ribs on  $5\frac{1}{2}$  whorls, then after an injury, continues with extremely feeble ribs which become obsolete on the body whorl; the sinus, however, continues to form the characteristic keel.

Other specimens become ribless from the 3rd or 4th whorl onwards (cf. *sigillata*).

var. *sigillata* Rve.

Fig. 5 b

Length of aperture subequal to, or a little shorter than spire (but apex broken in all specimens). Protoconch? Postnatal whorls 6- $6\frac{1}{2}$ . Whorls smooth, faint indications of ribs on the upper 4 or 5 whorls, and even less defined on earlier part of 6th whorl; a feeble spiral lira immediately below suture, and another marking the lower boundary of sulcus and middle of the lip sinus, thus corresponding with the series of nodules in typical *sinuata*; below this 2 or 3 additional very feeble lirae on body whorl, best seen where they have become white from abrasion. Sulcus very shallowly concave; lip sinus moderately wide, shallow, growth-lines very slightly curved. 19 (apex broken  $\times 9$  mm. (S. Afr. Mus.); 20 (protoconch missing)  $\times 8$  mm. (U.C.T.).

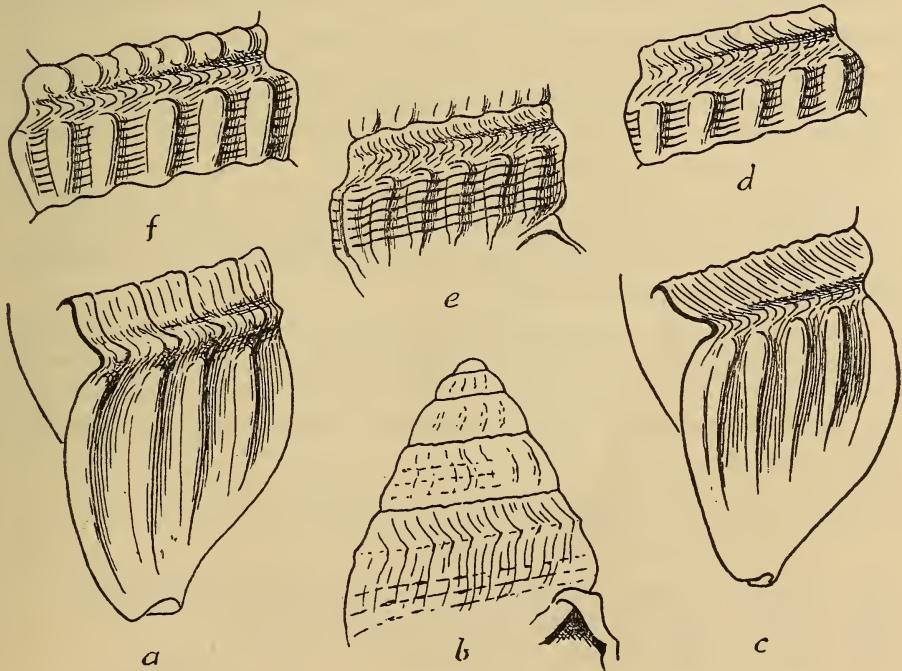


FIG. 5. a. *Clavatula sinuata* Born. b. var. *sigillata* Rve., worn, especially the apical whorls. c. *C. confusa* Smith. d. *C. kraussi* (Smith). e. *C. subventricosa* (Smith). f. *C. semicostata* Kiener.

Operculum as in *sinuata*,  $5 \times 2.75$  mm. in shell 16 mm. long.

Greyish-brown, mottled and streaked with white due mostly to abrasion; operculum horny; periostracum yellowish.

Radula as in *sinuata*.

West and east coasts of Cape Peninsula (S. Afr. Mus. and U.C.T.).

*Remarks.* Seems to be merely a smooth and less turritiform variety of *sinuata*.

*Clavatula kraussi* (Smith)

Fig. 5 d

1877. Smith. *Ann. Mag. Nat. Hist.* (4), xix, p. 500 (*Pleurotoma* (*Clionella*) *k.*).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 14 (*kraussii*).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 15.

Length of aperture about  $1\frac{1}{2}$  times in spire. Protoconch ? Postnatal whorls 7-8 (?9). Oblique ribs 11-12 on early whorls, 12-13 on later whorls, starting from suture above and on body whorl extending halfway across base; shoulder slightly *below* middle of whorl; suture not, or only very slightly embracing lower ends of ribs; no nodular or only a very feeble cingulum below suture; sulcus not strongly concave. Fine spiral striae close together on sulcus, farther apart on rest of whorl, about 4 on early whorls, 6 on later whorls, usually only visible between the ribs. Outer lip with deep and narrow sinus, a little distance from suture.  $33$  (without protoconch)  $\times 12$  mm. Turton: up to 42 mm.

Operculum oval, nucleus at middle of inner margin, which is thickened.

White with purplish-brown dots and zigzag lines following the growth-lines, especially noticeable on the sulcus, inner surface of outer lip white, operculum horny, periostracum pale yellowish.

Radula similar to that of *sinuata*, with *c.* 50 rows, central plate small, quadrangular, with acicular median cusp, lateral with wing-like appendage.

Living: East London, Richmond (Alexandria Division); Port Elizabeth; Jeffreys Bay; False Bay (all U.C.T.).

*Remarks.* The 33 mm. example has on the body whorl some inconspicuous nodules on the ribs below the shoulder. One specimen (S. Afr. Mus., locality ?),  $26 \times 9$  mm., has 16 ribs on each of the last four whorls, the early whorls worn.

There is a curious resemblance in colour pattern and spiral sculpture to *Drillia albotessellata* (q.v., p. 122).

*Clavatula subventricosa* (Smith)

Fig. 5 e

1877. Smith. *Ann. Mag. Nat. Hist.* (4), xix, p. 500 (*Pleurotoma* (*Clionella*) *s.*).

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 6, pl. 4, fig. 76 (bad).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 16, pl. 2, fig. 8 (*nerieia*).

Shoulder *above* middle of whorl. Protoconch ? Postnatal whorls 7 (? 8). Oblique ribs 14. Suture more or less embracing lower ends of ribs; cingulum

not very noticeable and only sometimes slightly nodulose. Ribs as prominent at their lower ends as at the shoulder, and on the body whorl ending below rather abruptly, the profile being thus squarish. Spiral striae in sulcus fewer and farther apart than in *kraussi*, below shoulder 3-4 on early whorls, 5-6 on later whorls. 23 × 9 mm.

Operculum oval, nucleus at middle of inner margin, which is thickened.

White with orange-brown or purplish brown irregular spots and marks on sulcus; a pale band crossing the ribs and grooves, below which the base is brown, inner surface of outer lip consequently white above, followed by a brown band, canal white; operculum horny, periostracum greyish-brown.

Radula similar to that of *sinuata*, with *c.* 50 rows, central plate small, quadrangular, with acicular median cusp, lateral with wing-like appendage.

Living: East London, Richmond (Alexandria Division); Kleinmond (Bathurst Division); Port Elizabeth (all U.C.T.).

Dead: Still Bay (S. Afr. Mus.).

*Remarks.* Sometimes difficult to distinguish from *semicostata* and *kraussi*, but the squarish profile and the brown band inside the aperture seem to be distinctive.

The Still Bay specimens (coll. Muir) are all worn, though two retain traces of the periostracum.

Sowerby's bad figure shows a *dark* band in the middle of the whorl.

In S. Afr. Mus. 7 specimens, without locality, identified by Tomlin as *nercia*. They seem to me to be examples of *subventricosa* in which the squarish profile of the whorls has been worn to a more evenly convex curve as in Bartsch's figure.

#### *Clavatula hottentota* (Smith)

Only one specimen with the animal is available. It was collected at Lambert's Bay (U.C.T., L.B.375.V.), and like many examples of *C. sinuata* and species of *Burnupena* etc. is much corroded, surface with minute perforations probably caused by *Cliona*. The ribs are scarcely traceable. Nevertheless the specimen does not seem referable to any other species. The shape and the lip sinus correspond with those of *hottentota*. 12 × 4.5 mm. Operculum (damaged) appears to have the nucleus more apical than lateral.

Radula similar to that of *sinuata*, with 25 rows, small central plate, elongate lateral plate with appendage.

This one specimen scarcely justifies transferring *hottentota* definitely to the genus *Clavatula*. Moreover there are no records of *hottentota* from the west coast, not even from the west coast of the Cape Peninsula or Table Bay.

For remarks on synonymy see *infra*, p. 120.

#### *Turris stolidus* (Hinds)

Fig. 3 e

1843. Hinds. *Proc. Zool. Soc. Lond.*, p. 37 (*Pleurotoma s.*).

1844. id. *Zool. Voy. 'Sulphur' Moll.*, p. 15, pl. 5, fig. 5 (*Pleurotoma s.*).



1923. Odhner. *Med. Göteborg. Mus.*, xxiii, p. 7 (*Drillia s.*).

1926. Tomlin. *Ann. Natal Mus.*, v, p. 290 (*Drillia s.*).

Length of aperture  $1\frac{1}{4}$ – $1\frac{1}{3}$  times in spire. Protoconch high,  $2\frac{1}{2}$  whorls, smooth. Postnatal whorls 9–10. Oblique ribs 11–12 on early whorls, 13–14 on later whorls, prominent at shoulder but petering out below, scarcely or only just reaching suture of following whorl. Fine spiral striae over whole whorl. No cingulum below suture. Outer lip with broad and deep sinus.  $68 \times 20$  mm. (protoconch and 1 whorl missing, width across shoulder of last whorl).

Operculum ovate, nucleus apical,  $11 \times 4$  mm. in shell 51 mm. long.

Uniform cream under the pale buff periostracum, operculum horny-amber. Animal white with black specks (K.H.B.).

Radula with 38 rows, no central plate, lateral with wing-like appendage.

Agulhas Bank, 40–43 fathoms (Hinds, Odhner). Glendower Beacon (Port Alfred area) to False Bay, 32–73 fathoms (S. Afr. Mus. P.F. Coll.). St. Sebastian Bay, 40 fathoms (coll. K.H.B.). False Bay (U.C.T.).

*Slender form*: slightly more slender, the ribs consequently closer together, with 5 ribs visible in face view<sup>13</sup> instead of 4. Yellowish brown (darker than typical form).  $52 \times 15$  mm.

Off Cape Hangklip, 73 fathoms, 1 together with 1 typical; off Glendower Beacon (Port Alfred area), 66 fathoms, 2. (S. Afr. Mus. P.F. Coll.)

*Remarks*. The 60 mm. *Pleurotoma (Surcula) margaritae* Smith (1904. *Ann. Mag. Nat. Hist.* (7), xiii, p. 458) from off the Andaman Islands, 405 fathoms, appears from the figure (1907. *Illustr. Zool. R.I.M.S. 'Investigator'*. *Moll.*, pl. 14, figs. 2, 2a) to be almost indistinguishable from *stolida*.

#### *Turris lignaria* (Sow.)

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 215, pl. 3, fig. 4 (*Pleurotoma (Clavus) l.*).

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 24 (*Clionella semicostata* var., non Kiener).

1925. Thiele. *ibid.*, xvii, p. 212, pl. 35 (23), fig. 10 (*Clionella semicostata* var., non Kiener).

Very close to *stolida*, but more compact in shape, the spire less tapering, canal shorter and rostrum blunter. Protoconch 2 whorls, smooth (*vide* Sowerby). Postnatal whorls 6 (? 7). Oblique axial ribs 10 on 1st whorl (as preserved, possibly this is the 2nd), increasing to 11 (12) on body whorl. Fine spiral striae over whole whorl. No cingulum. Lip sinus broad and deep. Columella slightly rimate at rostrum.  $22 \times 9$  mm. (Sowerby).

Pale brown, columella white. Yellowish-brown, columella whitish (Thiele).

Off west coast of Cape Peninsula, 136 fathoms (Sowerby); Agulhas Bank ( $34^{\circ} 51' S.$ ,  $19^{\circ} 37' E.$ ), 80 metres (von Martens); False Bay, 32 fathoms, 1 dead (S. Afr. Mus. P.F. Coll.).

<sup>13</sup> i.e. not counting the profile rib on either side.



*Remarks.* Might almost be regarded as a squat form of *stolida*. I have seen only two specimens. One returned by Sowerby with his label; this cannot be regarded as the type although it measures  $22 \times 9$  mm. because it lacks the 2-whorled protoconch (possibly also the 1st postnatal whorl). Sowerby gave the total number of whorls as  $10\frac{1}{2}$ ; this seems excessive (cf. his figure) and is probably a misprint.

The False Bay example has the same width as this specimen, but has only the 4 last whorls.

Both these examples differ from equal-sized *stolida* by the rimate columella; only in large examples (40 mm. upwards) of the latter is the margin of the columella glaze slightly raised as a free edge, but there is no (umbilical) indent.

Although the operculum and radula are unknown, this species is included provisionally in *Turris* for the sake of comparison with *stolida*.

*Turris cingulifera* (Lam.)

Fig. 6 a and profile

1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 2 (*Pleurotoma c.*).

1917. Melvill. *Proc. Mal. Soc.*, xii, p. 162 (*Surcula c.*).

Anterior canal short. Length of aperture less than half total length. Protoconch  $3\frac{1}{2}$  (4) whorls, diam. 1.25 mm., alt. 1.75 mm., apex smooth, following whorls with slightly curved axial riblets, *c.* 26 on last whorl, junction with 1st postnatal whorl abrupt. Below suture 2 (in early whorls)—5 (later whorls) spiral lirae followed by a deep narrow groove, and then 2 lirae; lip sinus forming the moderately prominent shoulder, with 2 (3) lirae, followed by 2 lirae with finer intervening lirae; on base 5–6 lirae with intermediates. Sometimes axial striae forming a fine cancellate sculpture.  $55 \times 15$  mm. (minus protoconch, width across shoulder).

White, lip sinus (shoulder) with irregularly spaced brown spots, the other lirae with numerous brown dots.

Dead: Durban (Sowerby); Natal coast and Mozambique Island (S. Afr. Mus.); off Umkomaas River, 40 fathoms, 1 juv. dead but unworn. (S. Afr. Mus. P.F. Coll.)

*Distribution.* Farquhar Island (S. Afr. Mus.), Mauritius, Madagascar, Seychelles, Indo-Pacific.

*Remarks.* Protoconch described from a 13.5 mm. juvenile.

*Turris acuta* (Perry)

Fig. 6 profile

1811. Perry. *Conchology*, pl. 54, fig. 5.

1822. Lamarck. *Anim. sans Vert.*, vii, p. 95 (*Pleurotoma tigrina*).

1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 2 (*P. tigrina*).

1917. Melvill. *Proc. Mal. Soc.*, xii, p. 142.

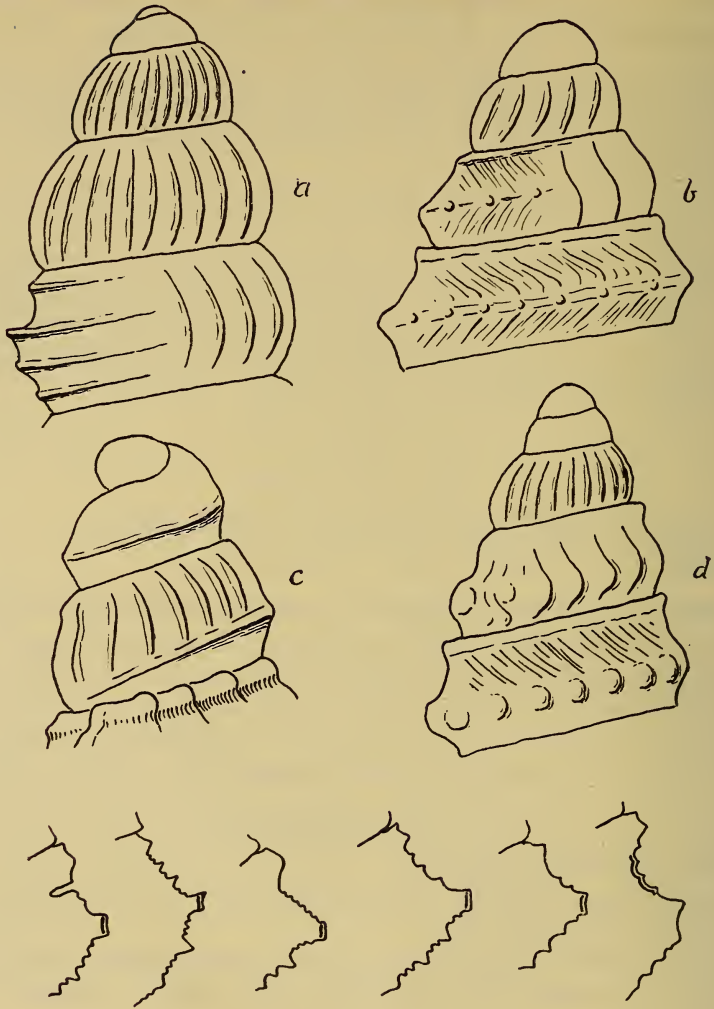


FIG. 6. Protoconchs of: a. *Turris cingulifera* (Lam.). b. *T. indica* Bolten. c. *T. multiseriata* (Smith). d. *T. gilchristi* (Sow.). Profiles of (left to right): *cingulifera*, *indica*, *acuta*, *gilchristi*, *lobata*, *multiseriata*; position of sinus marked by a double line.

Anterior canal long. Length of aperture half total length.

Below suture a sharp keel, followed by several lirae all of about the same strength; lip sinus forming a prominent shoulder, square in profile, below which on body whorl 3 (4) sharp lirae with finer intermediaries.

57 × 15 mm. (width across shoulder).

Operculum ovate, nucleus apical, 9 × 5 mm. in shell 57 mm. long.

Biscuit colour, with irregularly spaced dark brown spots on the keel below suture, and numerous dots on the margins of the lip sinus (shoulder) and the other lirae.

Dead: Durban (Sowerby); 2 worn specimens probably from Durban (S. Afr. Mus.).

*Distribution.* Farquhar Island (S. Afr. Mus.); Mauritius, Madagascar, Seychelles, Indo-Pacific.

*Remarks.* Distinguished from *indica* by the larger spots being on the keel below suture, the lirae between the keel and shoulder all of about same strength, and shoulder square in profile.

*Turris indica* Bolten-Röding

Figs. 3 *g*, 6 *b* and profile

1798. Bolten-Röding. *Mus. Bolt.*, p. 124, no. 1594 (*indica*).

1822. Lamarck. *Anim. sans Vert.*, vii, p. 95 (*marmorata*).

1843. Reeve. *Conch. Icon.*, i, pl. 3, fig. 21 *a* and *b* (var. *maculata*).

1902. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 100 (*marmorata*).

1917. Melvill. *Proc. Mal. Soc.*, xii, p. 143.

1926. Tomlin. *Ann. Natal Mus.*, v, p. 289 (*marmorata*).

1942. Gravely. *Bull. Madras Govt. Mus.*, n. s. V, no. 2, p. 73 (in key), fig. 14(1).

Anterior canal very long. Length of aperture a little more than half total length. Protoconch  $2\frac{1}{2}$  whorls, apex smooth, followed by 12-13 axial riblets, diam. 1.25, alt. 1.5 mm.

Postnatal whorls 10. Suture slightly underriding preceding whorl. Below suture a slightly prominent keel followed by several lirae of varying strength; lip sinus forming the shoulder, the upper edge of which forms a very prominent keel, below sinus 4 or more sharp lirae with finer intermediaries.  $59 \times 16$  mm. (protoconch and end of canal broken, width across shoulder; in proportion to an unbroken Philippine Is. specimen  $52 \times 13$  mm. the full length would have been 64 mm.).

Operculum ovate, nucleus apical,  $5.75 \times 3$  mm. in shell 32 mm. long.

Marbled brown and white in varying proportions, but the larger dark brown spots or marks are on the shoulder sinus. South African specimens are var. *maculata*: white or biscuit colour, with brown or orange-brown spots on shoulder and numerous smaller spots and dots on the other lirae. Albino specimens are known.

Radula with about 45 (specimen incomplete) pairs of teeth, no central plate, lateral without wing-like appendage (see p. 93).

Off Tugela River (Natal), 55 fathoms (Sowerby); Natal, from fish stomachs (Tomlin); off Tugela River, 40-73 fathoms, off Cape Vidal and O'Neil Peak (Zululand), 55-100 fathoms (S. Afr. Mus. P.F. Coll.). Most specimens dead, but living ones were taken off the Tugela River.

*Distribution.* Cargados Islands, Red Sea, Indo-Pacific.

*Remarks.* Distinguished from *acuta* by the larger spots being on the shoulder, the varying strength of the lirae between suture and shoulder, and the projecting upper edge of the latter.

*Turris gilchristi* (Sow.)

Figs. 3 *h*, 6 *d* and profile

1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 2 (*monilifera* non Pease).  
 1902. id. *Mar. Invest. S. Afr.*, ii, p. 99, pl. 2, fig. 9 (*Pleurotoma g.*).  
 1903. Smith. *Proc. Mal. Soc.*, v, p. 362.  
 1917. Melvill. *ibid.*, xii, p. 145.

Anterior canal very long. Length of aperture equal to, or a little more or a little less than half total length. Protoconch  $3\frac{1}{2}$  whorls, diam. 1.3, alt. 1.75 mm., apex smooth, followed by 20–25 axial riblets on last whorl and a half. Post-natal whorls 9–10. Suture slightly canaliculate. Below suture one strong keel followed by 3–4 less strong lirae; lip sinus forming an outstanding girdle with numerous tubercles, oblong in axial direction; below shoulder of last whorl 3–4 main keels with smaller intermediary lirae; oblique axial growth lines well marked.  $61 \times 18$  mm.

Operculum ovate, nucleus apical,  $7 \times 3$  mm. in 39 mm. shell.

White, some specimens with orange-brown spots in the hollows between the shoulder knobs, and orange spots or suffusions on the lirae above and below.

Radula with about 70 pairs of teeth, no central plate, lateral without wing-like appendage. The radula of a Farquhar Island specimen corresponds with this.

Off Tugela River mouth (Natal), 55 fathoms (Sowerby); Zululand and Natal coast 27–90 fathoms, and as far south as off Cape Natal (Durban), 185–200 fathoms; off Hood Point (East London), 49 fathoms. (S. Afr. Mus. P.F. Coll.)

*Distribution.* Farquhar Island (S. Afr. Mus.); Mekran coast (S. Persia), 180 fathoms (Melvill).

*Remarks.* Smith suggested that the specimen recorded by Sowerby as *monilifera* was probably a *gilchristi*. Pease's description of the Sandwich Island species, as far as it goes, fits *gilchristi*; but actual specimens should be compared.

Sowerby in 1902 compared his species with the Californian *gemmata* Hinds and the Chinese *Kieneri* Doumet. He did not specify the differences but referred to the size, which may be a misleading character; Sowerby saw no specimens of *gilchristi* larger than 32 mm.

Although broken, the apex (protoconch plus 5 whorls) from the Hood Point locality is unworn, indicating that the species may occur living as far south as the East London area. Very few bottom samples are available between here and the Natal coast.

Plump and slim forms occur, e.g.  $38 \times 13$  mm. and  $39 \times 11$  mm.; sometimes both forms were taken in the same haul. The rather striking difference



in appearance is due mainly to the greater or lesser prominence of the tuberculate shoulder band; and in the slim forms not only are the tubercles less prominent but on the later whorls they tend to degenerate into a double keel crossed by coarse growth-lines (cf. von Martens' remarks on *P. carinata* Gray, 1903. *D. Tiefsee Exp.*, vii, p. 77; also Smith on *vagata*, 1904. *Ann. Mag. Nat. Hist.* (7), xiii, p. 456). Such specimens appear at first sight to be quite different from strongly tuberculate specimens.

Further, the spiral lirae and the oblique growth-lines vary in intensity; the former may be high and sharp, with crinkly edges, especially the uppermost lira forming the lower margin of the sutural canal; and on the base of the body whorl the growth lines may produce an almost cancellate sculpture.

This species should be compared with *P. (Gemmula) carinata* Gray, a figure of which is given in *Illustr. Zool. R.I.M.S. 'Investigator'*, *Moll.*, pl. 20, figs. 3, 4, 1908. The specimens from off the Somaliland coast and Nicobars, identified as *carinata* by von Martens (1903, loc. cit., p. 76), were later regarded by Thiele as a separate species: *valdiviae* Thiele (1925. *D. Tiefsee Exp.*, xvii, p. 208, pl. 35 (23), fig. 1). Thiele stated (p. 208) that the figure of *vagata* Smith 1895 and 1904 (*Illustr. Zool. R.I.M.S. 'Investigator' Moll.*, pl. 14, figs. 3, 3a, 1907) was similar to *valdiviae*; and likewise *P. sibogae* Schepman.

*P. (Gemmula) gemmulina* von Martens 1902 (1903, loc. cit., p. 77, pl. 1, figs. 2, 2a) from the eastern Indian Ocean is also not dissimilar; and is compared by von Martens (p. 78) with *praesignis* Smith 1895 from Ceylon and (1906) the Coromandel coast.

*P. aethiopica* Thiele (1925, loc. cit., p. 208, pl. 34 (22), fig. 25), from off the East African coast, and *P. fusiformis* Thiele (1925, loc. cit., p. 210, pl. 34 (22), fig. 24) from the East Indies, also invite comparison.

Melville compared his specimens with *ceylonica* Smith: the tubercles are smaller and more compact in *gilchristi*; and the latter is narrower than *carinata* Gray=*granosa* (Helb.).

All these species can be more or less closely matched among the small series (60) of *gilchristi* in S. Afr. Mus.; but it is inconceivable that so many separate species, including *gilchristi*, exist together in one small area off the Natal-Zululand coast.

For the present I maintain *gilchristi*, the radula of which is now known, though eventually it will have to become a synonym of one of the above species.

*Turris lobata* (Sow.)

Figs. 3 i, j, 6 profile

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 213, pl. 4, fig. 9 (*Pleurotoma (Surcula) l.*).

1906. Smith. *Ann. Natal Mus.*, i, p. 24 (*Pleurotoma*, not *Surcula*).

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 210 (similarity of shell with *bisinuata*).

Anterior canal short. Length of aperture  $1\frac{1}{3}$ – $1\frac{1}{2}$  in spire. Protoconch ? Postnatal whorls 10. Below suture one rather prominent sharp keel, followed by one feeble lira (or 2 lirae); lip sinus forming an outstanding nodulose girdle, nodules rounded or very slightly oblong in an axial direction; only a portion of protoconch preserved in one specimen, but nodules beginning apparently immediately on first postnatal whorl. Below girdle 3 spiral lirae, the lowermost one in some specimens becoming prominent and coalescing with the middle lira to form a strong costa forming a sinus on margin of outer lip.  $31 \times 12$  mm. lobate specimen;  $32 \times 11$  mm. non-lobate;  $35 \times 14$  mm. lobate;  $39 \times 13$  mm., costa present but lobe not formed. (In all cases protoconch missing.)

Operculum oval, nucleus apical,  $9 \times 4$  mm. in 35 mm. shell.

Radula (of an East London specimen) with *c.* 75 pairs of teeth, no central plate, lateral broadly cuneiform, one margin sharply angular (in edge view), no appendage.

Off Cape Natal (Durban), 440 fathoms, and (dead shells) off Buffalo River (East London), 310 fathoms (Sowerby).

S. Afr. Mus. P.F. Coll.: Co-types (topotypes) from above localities, one of the East London specimens taken alive.

Off Cape Point, 380–900 fathoms (3 living and 5 dead shells).

The largest of the Cape Point shells (apex corroded, only 6 whorls remaining) is  $40 \times 14$  mm. These examples are more corroded than those from the Natal-East London area. There are 3–4 prominent lirae between the keel below the suture and the nodular girdle, at least in the earlier whorls; growth-lines much more prominent and on the later whorls tending to obliterate the spiral lirae. No indication of the formation of a basal costa and additional sinus in outer lip. Operculum as above.

Radula with about 70 pairs of teeth, the lateral plate broadly cuneiform as in the East London example, but no angular margin (in edge view).

Conchologically the Cape Point examples are not separable from the Natal-East London specimens. The slight difference in the radula teeth is scarcely of specific importance; but there is only one radula of each for comparison.

*Remarks.* The formation of a strong basal costa and an additional sinus on the outer lip is paralleled in *Ptychosyrinx bisinuata* (von Martens, 1901) (see: 1903. *D. Tiefsee Exp.*, vii, p. 82, pl. 1, fig. 8; juvenile, *ibid.*, pl. 1, fig. 3, as *rotatilis*; and 1925. *Thiele. ibid.*, xvii, p. 210, pl. 35 (23), fig. 4), from off the East African and Somaliland coast. The first 3 whorls of this species are axially ribbed, but so far as the embryonic and early whorls are preserved in the corroded South African specimens there is no indication of such ribbing in *lobata*. In other respects there are no conchological differences; in fact, von Martens's figure 8 might almost have been drawn from one of the East London examples.

The genus *Ptychosyrinx*, however, is distinguished by the concentric operculum, and by the large central plate in the radula.

This case illustrates the danger of attempting to classify dead shells.

Melville (1917. *Proc. Mal. Soc.*, xii, p. 150) records the formation of a somewhat similar lobe on the outer lip of *Drillia athyrma* Melv. & Stand. 1901, from the Persian Gulf.

*Turris (Gemmula) multiseriata* (Smith)

Fig. 6 *c* and profile

1877. Smith. *Ann. Mag. Nat. Hist.* (4), xix, p. 491.

1901. Melville & Standen. *Proc. Zool. Soc. Lond.*, ii, p. 434 (*Pleurotoma (Gemmula m.)*).

1917. Melville. *Proc. Mal. Soc.*, xii, p. 145, pl. 8, fig. 3 (*Turris (Gemmula m.)*).

Aperture  $1\frac{1}{4}$ – $1\frac{1}{3}$  times in spire. Protoconch  $2\frac{1}{2}$  whorls, diam. 0.5 mm., apex smooth, followed by a spiral keel, which is continued on to shoulder nodules on 1st postnatal whorl. Postnatal whorls 7. Curved axial plicae (*c.* 21), retractive and varicoid between suture and lip sinus, and below sinus forming a shoulder with strong nodules (oblong in axial direction), continued on base nearly to extremity; crossed by spiral lirae, 2 on the varicoid nodules, 2–3 in lip sinus, 2 on shoulder nodules, 2–3 below, with *c.* 10 additional ones on base; on base axial and spiral lirae form a more or less cancellate sculpture, slightly nodulose at the intersections. Lip sinus deep, remote from suture. Canal short.  $15 \times 5.5$  mm. Red-brown to ochraceous (Melville).

Off Umvoti and Umhloti River mouths (Natal) 27 fathoms, 5 fresh; off Tongaat River, 36 fathoms, 1 dead; Algoa Bay, 21 fathoms, 1 dead. (S. Afr. Mus. P.F. Coll.)

*Distribution.* Ceylon, Persian Gulf, Karachi. From the latter locality very large specimens  $\frac{5}{8}$  inch long. Also China Seas.

*Remarks.* Three of the South African specimens were identified by Sowerby. At first sight somewhat similar to *gilchristi* on account of the axially oblong tubercles, but the protoconchs are quite different.

Operculum and radula not present in the South African examples. It is here assumed that the radula has been examined (by Melville or some other author) and that the species is correctly classified in the genus *Turris*.

*Turris saldanhae* n. sp.

Figs. 3 *f*, 7

Aperture subequal to spire, or a little shorter. Protoconch broken. Postnatal whorls  $7\frac{1}{2}$ –8. Shoulder somewhat angular (but frequently corroded), a little above middle of whorl; oblique axial ribs from shoulder to suture below, petering out on base, 12–14 on earlier whorls, 15–16 on later whorls, subequal in width to intervening grooves; crossed by spiral lirae, 2 or 3 on 3rd whorl, 3 or 4 on 4th, increasing to 7 or 8 (9) on last whorl, 12–14 additional lirae on base; growth-lines not conspicuous. Outer lip with broad and moderately



deep sinus; canal moderately long. 33-34 (protoconch broken)  $\times$  12 mm.; and  $46 \times 15$  mm.

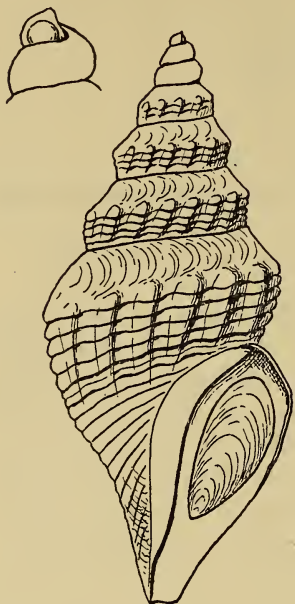


FIG. 7. *Turris saldanhae* n. sp. with protoconch further enlarged.

Operculum ovate, nucleus apical,  $9 \times 4$  mm. in 33 mm. shell.

White with yellowish-brown periostracum, operculum amber.

Radula with 60 pairs of teeth, no central plate, lateral with wing-like appendage.

*Type locality.* Off Baboon Point (Saldanha Bay), 31 fathoms (S. Afr. Mus. A1738, P.F. Coll.).

$26^{\circ} 33'$  S.,  $15^{\circ}$  E. (off Lüderitzbucht), 55 metres (Fisheries Survey vessel. *Africana II*, AFR.1224); also AFR.1263,  $26^{\circ} 33'$  S.,  $14^{\circ} 17'$  E., 311 metres, and AFR.1319,  $26^{\circ}$  S.,  $14^{\circ} 35'$  E., 183 metres.

*Remarks.* All the specimens taken by the *Pieter Faure* are more or less corroded, the protoconch broken off and, even in the smallest example (22 mm.), the apex stopped with secondary shelly substance. The 1st and 2nd whorls appear to have been smooth, the ribs beginning on the 3rd whorl.

The 4 *Africana* examples,  $18 \times 8$  mm. up to  $46 \times 15$  mm., though more slender, are obviously conspecific. The protoconchs are broken off and the early whorls corroded, though not so much as in the Saldanha Bay examples. Consequently the lirae are more prominent, and owing to the slight lengthening of the whorls there is an additional spiral lira on each whorl, and 15-20 lirae on the base. At first glance there appears to be a likeness between the *Africana* 46 mm. example and the *enlarged* figure of *macilenta* Melvill (see *Drillia platystoma*, p. 125), but the proportion of aperture to spire, and number of ribs and spiral lirae, are different.

In sculpture this species is rather similar to the worn 18.6 mm. *Drillia halidoma* Bartsch 1915 from the 'Cape of Good Hope'. The latter, however, has fewer spiral lirae (see *Clavatula semicostata*).

Three specimens, 26, 27 and 33 mm. long, from off Cape Point, 250-700 fathoms (S. Afr. Mus. A362-A364, P.F. Coll.), agree with the above except the spiral lirae are finer and more numerous, due to the development of intermediaries; this is especially noticeable on the base.

All three are dead shells, white, without protoconchs, slightly corroded, and without any trace of periostracum.



## Subfam. BRACHYTOMINAE Thiele

'*Clavatula tumida* (Sow.)

Figs. 4 e, 8 a, 9 a

1870. Sowerby. *Proc. Zool. Soc. Lond.*, p. 253 (*Clavatula t.*).  
 1892. id., *Mar. Sh. S. Afr.*, p. 5, pl. 5, fig. 101 (*Pleurotoma t.*).  
 1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 24.  
 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 19, pl. 2, fig. 3 (*Clavatula haliplex*).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 19 (*haliplex*), and p. 19, pl. 4, no. 146 (*gravis*, non Hinds).

Protoconch  $1\frac{1}{2}$ -2 whorls (junction with 1st postnatal whorl not clear) diam. 1.75-2 mm., alt. 2-2.25 mm., usually corroded. Postnatal whorls 7-8. Oblique nodules above suture longer than in *gravis*, better described as oblique ridges. Cingulum below suture not very timid, obscurely nodulose; or in other words: the arcuate oblique ridges cross the whole whorl but are interrupted by the sulcus groove, above which they are less conspicuous (often quite obsolete) than they are below; no indication of additional nodules or a ridge below shoulder on body whorl. Spiral striae on early whorls (if not corroded), about 10 on 1st whorl, 12 on 2nd, microscopically granulose at intersections with growth-lines; striae usually obsolete on later whorls. Lip sinus narrow and shallow. 60 (minus protoconch)  $\times$  20 mm. Another shell: 56  $\times$  20 mm. Sowerby's figure, if natural size, is 61 mm.

Operculum oval, nucleus slightly below middle of inner margin, which is thickened on outer surface; 11  $\times$  6 mm. in 48 mm. shell.

Cream under the yellowish-brown periostracum, operculum horny. Animal flesh-coloured.

Radula without basal membrane, 20-24 teeth (3 radulae examined), elongate, slender, basal half slightly thicker, apex acute, one apical barb, another on opposite side a little farther proximally.

Agulhas Bank (Sowerby). Off Cape Morgan, 34 fathoms, and Agulhas Bank to False Bay, 27-55 fathoms (S. Afr. Mus. P.F. Coll.). False Bay, 54 metres (U.C.T.).

*Remarks.* Two live specimens taken in the same haul (P.F. Coll.) represent stout and slim forms: 49  $\times$  17 mm. and 52  $\times$  16 mm. respectively.

Bartsch's *haliplex* appears to be a young worn specimen of this species. There is one in S. Afr. Mus. almost exactly the same size as Bartsch's type which corresponds with his description and figure. It has the upper part of the whorls white where the periostracum is worn off.

This species combines a *Clavatula*-like operculum with a radula composed of a bunch of barbed teeth without basal membrane as in the *Brachytominae*.

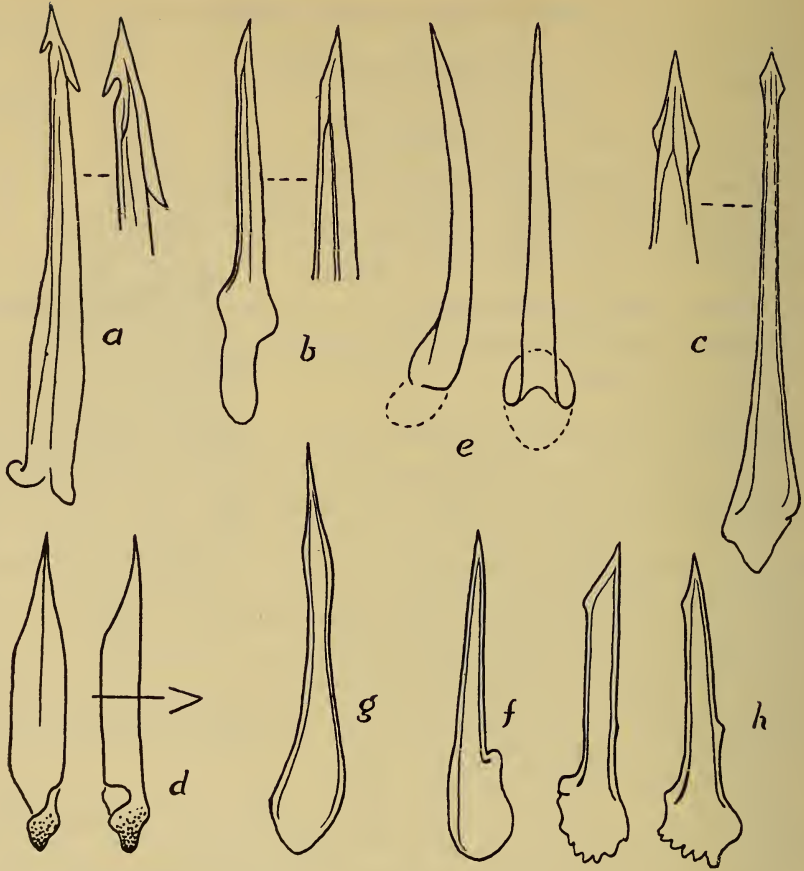


FIG. 8. Radula teeth of: a. '*Clavatulæ tumida*' (Sow.). b. '*Genotia belæformis*' (Sow.). c. '*Asthenotoma vertebrata*' (Smith). d. '*Cythara africana*' (Sow.). e. '*Lienardia grayi*' (Rve.). f. '*Drillia scitecostata*' (Sow.). g. '*Drillia fultoni*' (Sow.). h. '*Philbertia capensis*' (Smith).

'*Genotia belæformis*' (Sow.)

Figs. 8 b, 9 b

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 216, pl. 4, fig. 8 (*Pleurotoma (Genotia) b.*).

1906. Smith. *Ann. Natal Mus.*, i, p. 24 (*Genotia b.*).

Anterior canal short. Length of aperture subequal to half total length. Protoconch  $1\frac{1}{2}$  whorls, mammillate, diam. 1.75, alt. 1.5 mm., smooth (but partly corroded). Postnatal whorls 5. Whole whorl with fine close spiral striae, crossed by oblique growth-lines, the latter immediately below the suture forming a narrow crimped band above the sulcus. Outer lip prominent, sinus broad and deep.  $24 \times 11$  mm.

Operculum ovate, nucleus apical (apex broken in the only example).

Radula without basal membrane, teeth narrow, aciculate, shallowly grooved nearly to apex, margins thickened.

Off Cape Point, 230 fathoms (Sowerby). Two cotypes in S. Afr. Mus.

Off Cape Point, 190 fathoms, 1 live, 2 dead: 36° 40' S., 21° 26' E., 200 fathoms, 1 dead but fresh. (S. Afr. Mus. P.F. Coll.)

*Remarks.* The cotypes are corroded; two of the other Cape Point specimens are slightly corroded at the apex, but the third (15 mm. long) has an unbroken protoconch. The largest specimen is from the southern slope of the Agulhas Bank; it also has an unbroken protoconch, and is more strongly sculptured, some of the sigmoid growth-lines, especially across the sulcus, being very sharp. Sowerby's expression 'a punctured groove a little below the suture' refers to the most concave portion of the sulcus immediately below the crimped band.

Generic position doubtful; the radula excludes it from the *Turrinae*, and the possession of an operculum from *Genota* (*Cytharinae*). The radula is very like that of *Thesbia nana* (see: Sars. 1878. *Moll. Reg. Arct. Norv.*, pl. viii, figs. 3 *c*, *d*), another *Cytharine* genus without operculum.

Gen. ASTHENOTOMA Harr. & Burr.

1942. Gravely. *Bull. Madras Govt. Mus.*, n.s. v, no. 2, pp. 71, 72 (key to 3 closely allied species).

*Asthenotoma vertebrata* (Smith)

Figs. 8 *c*, 9 *c*

1875. Smith. *Ann. Mag. Nat. Hist.* (4), xv, p. 416 (*Pleurotoma v.*).

1903. id. *Proc. Mal. Soc.*, v, p. 363.

1917. Melvill. *ibid.*, xii, p. 149, pl. 8, fig. 4 (*Turris* (*Tomopleura*) *v.*).

1942. Gravely. *loc. cit.*, p. 72, figs. 13 *a* (inverted), and 14 (2) (not good).

Aperture  $1\frac{1}{2}$  times in spire. Protoconch  $1\frac{1}{2}$  or 2 whorls (incomplete), diam. 0.5 mm., smooth, with a few feeble axial plicae before junction with 1st post-natal whorl. Postnatal whorls  $10\frac{1}{2}$ ; 1st with one spiral keel in middle, on later whorls successively 3, 4, and 5 keels; one slightly below suture forming upper boundary of sulcus, keel in middle of whorl the most prominent (Gravely: 'lower cardinal spiral'), and forming lower boundary of sulcus; below this 3 keels, and additional lirae on base. Axial plicae between the keels; each plica in the sulcus is slightly nodulose forming a feeble moniliform lira in middle of sulcus (Gravely: 'intracardinal spiral'). Columella with a more or less prominent pleat. Canal short. 18.5 × 5.5 mm.

Operculum ovoid, nucleus at the rectangular apex, inner margin straight for greater part of length.

Pale greyish, interior of aperture violaceous.

Radula without basal membrane, *c.* 48 teeth (i.e. 24 pairs), elongate, slender, with a very delicate flange (not barbed) on either side of apex.

Durban (Smith, 1903).

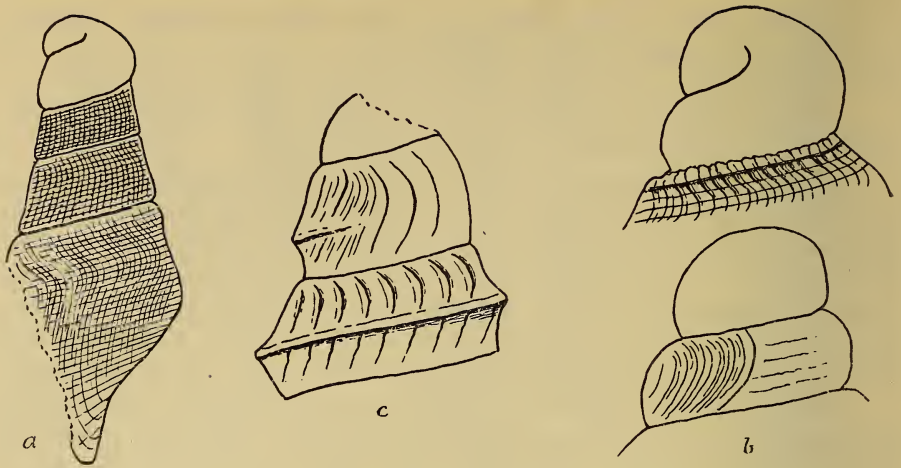


FIG. 9. Protoconchs of: a. '*Clavatula*' *tumida* (Sow.). b. '*Genotia*' *belaeformis* (Sow.). c. *Asthenotoma vertebrata* (Smith).

Off Umhlanga River (north of Durban), 22–26 fathoms, 1 dead (S. Afr. Mus. P.F. Coll.).

Delagoa Bay, 1 dead (S. Afr. Mus. Coll. K.H.B.).

Morrumbene estuary, Inhambane, Portuguese East Africa, 2 living (U.C.T.).

*Distribution.* Karachi, Madras, and Japan.

*Remarks.* Melvill, contrary to some authors, keeps *vertebrata* separate from *nivea* (Phil.) and its var. *violacea* Hinds.

From the description and figure it is impossible to say how this species compares with the Mauritian *Daphnella elata* Sow. (1893. *Proc. Zool. Soc. Lond.*, p. 490, pl. 38, figs. 19, 20).

*Asthenotoma eva* (Thiele)

Fig. 21 d

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 227, pl. 37 (25), fig. 12 (*Bela e.*).

Protoconch  $1\frac{1}{2}$  whorls, smooth. Postnatal whorls 3. Spiral keels 2 on each whorl, the upper one peripheral and more prominent; distinct sharp, close-set axial pliculae or growth-lines across sulcus and *between* the keels; on base 4 additional distinct lirae and 3–4 obscure ones.  $3.75 \times 1.5$  mm. Thiele:  $4.8 \times 2.2$  mm.

Operculum (*apud* Thiele) oval, narrowed below.

Radula (*apud* Thiele) without basal membrane, teeth 'arrow-like' ('pfeilzähne', not figured by Thiele).

$35^{\circ} 19' S.$ ,  $20^{\circ} 15' E.$ , 126 metres (Thiele).

Off Cape Recife, 56 fathoms, 1 dead (S. Afr. Mus. A8563, P.F. Coll.).



*Remarks.* Thiele placed his species in *Bela* because it had an operculum and 'pfeilzähne', and from the character of the shell suggested the genus *Drilliola*. In 1929, however, he put *Bela* as a synonym of *Mangilia* (*Cytharinae*, without operculum), and *Drilliola* as subgen. of *Asthenotoma* in the *Brachytominae*.

The sculpture is not unlike that of *Asthenotoma* species. The axial pliculae are more conspicuous on the present specimen than in Thiele's figure.

Subfam. CYTHARINAE

*Cythara africana* (Sow.)

Figs. 8 *d*, 10 *a*

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 216, pl. 5, fig. 9 (*Mangilia* (*Eucythara*) *a.*).

1906. Smith. *Ann. Natal Mus.*, i, p. 27 (listed).

Protoconch  $1\frac{1}{2}$  or 2 whorls, diam. 0.3–0.4, alt. 0.4 mm. (but nucleus broken), smooth, last half whorl with rather closely set, narrow axial plicae. Postnatal whorls 7. Axial ribs 11 on 1st whorl, increasing to 12 on penultimate, and

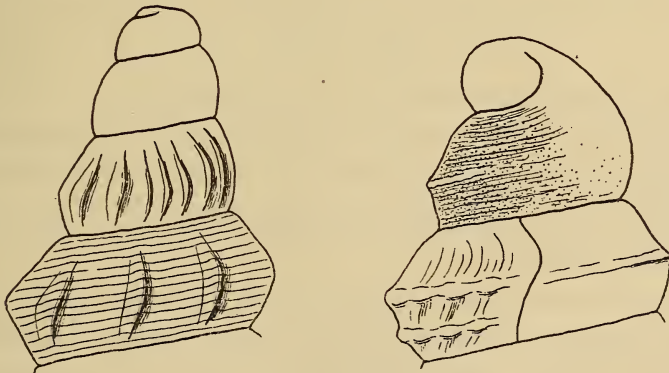


FIG. 10. Protoconchs of: *a.* *Cythara africana* (Sow.). *b.* *Lienardia grayi* (Rve.).

12–13 (14) on last whorl, from suture to suture, and extending to extremity of base, crossed by numerous very fine spiral striae over whole whorl. Columella with numerous (at least 25 in the Type) plicae. Outer lip in adult with sharp margin, internally plicate (*c.* 25), externally with varix. 20 × 7 mm.

No operculum.

Coloration faded except a faint mauve band on the sulcus and another below middle of body whorl, some dull orange spots on the lip varix.

Radula without basal membrane, number of teeth ? (only 10 observed during treatment with KOH); tooth forming a v-shaped channel, with acute non-barbed apex, base pear-shaped.

Off Umhloti River mouth (Natal), 25–27 fathoms. Type, cotype, and 6 other specimens in S. Afr. Mus. (P.F. Coll.).

*Remarks.* Only eight specimens were obtained in three hauls in the same area, the actual bearings being: Umhloti River mouth NW.  $\times$  W  $\frac{3}{4}$  W.  $2\frac{3}{4}$  miles, 25 fathoms; NNW.  $1\frac{1}{2}$  miles, 27 fathoms; and N.  $\times$  E., 2 miles, 27 fathoms.

The cotype is 18 mm. long, with thin outer lip.

The cotype and one of the others were taken alive. In all the specimens the actual nucleus of the protoconch is broken.

The radula teeth seem shaped to conduct poison into a wounded prey. The true shape is not seen in the final mount, but was happily seen at an earlier stage by delicately sliding the cover-slip so as to roll the teeth into different positions. Thiele (1925. *D. Tiefsee Exp.*, xvii, p. 207) mentions the 'rinnenförmige Endteil . . . mit übergebogenen Lamellen' in *Mangilia* (*Benthomangilia*); and the same shape probably occurs in *Mangilia costata* and the species of 'Bela' figured by Sars (1878. *Moll. Reg. Arct. Norv.*, pl. viii, figs. 7, etc., especially 12). In *Thesbia nana* Sars shows the tooth with a simple shallow groove (loc. cit., fig. 3) and in *Clathurella leufroyi* (fig. 2) with narrow marginal flanges.

*Lienardia grayi* (Rve.)

Figs. 8 e, 10 b

1845. Reeve. *Proc. Zool. Soc. Lond.*, p. 114 (*Pleurotoma g.*).

1901. Sowerby. *Proc. Mal. Soc.*, iv, p. 214, pl. 22, fig. 20 (*Drillia rugisculpta*).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 27, pl. 3, fig. 8 (*Mangilia arata*).

1915. id. *ibid.*, p. 29 (*Mangilia g.*).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 28 (*Mangilia g.*); and p. 28, pl. 6, no. 211 (*grayi* var. *assimilans*).

Protoconch 2 whorls, diam. and alt. 0.5 mm., smooth but in living examples very faintly shagreened and spirally striate, last three-quarters of 2nd whorl with a spiral lira, continued as the upper of the 2 lirae on 1st postnatal whorl. Postnatal whorls 4. Axial riblets 10–11 on 1st whorl, increasing to (12)13–14(15) on last whorl, more or less traceable across sulcus, rounded at shoulder; crossed by 2 spiral lirae on 1st whorl, 2–3 on 2nd, increasing to 5–6(7) on 4th, with 13–15 additional lirae on base, usually 2–3 very fine lirae on sulcus above shoulder. Columella with 2–3 plicae; outer lip in adult thickened, inner margin denticulate.  $8.5 \times 3.75$  mm.

No operculum.

Castaneous brown; beach specimens castaneous, amber, buff, white, unicolorous or with pale band, broad or narrow, around middle of last whorl.

Only one animal available for dissection. The tentacles were short, rounded lobes (? due to injury), the eyes in an expansion on outer margin.

Radula without basal membrane, about 35 pairs of slender acicular teeth, expanded at base; shallowly grooved.

Table Bay, False Bay, Still Bay (S. Afr. Mus.); off Cove Rock (East London), 27 fathoms (S. Afr. Mus. P.F. Coll.); Still Bay (U.C.T.); living example from Cape Peninsula (U.C.T.) examined.

*Remarks.* Two lots, both from the Cape Peninsula, were labelled respectively *grayi* and *rugisculpta* by Tomlin. I fail to see any differences.

The species seems to be a typical *Lienardia*. The Tertiary genus *Glyphostoma* has precedence, but as Thiele (1929) remarked it is not feasible to include living molluscs in fossil genera of which the anatomy is unknown.

*Glyphostoma siren* Smith (1904. *J. Malac.*, xi, p. 28, pl. 2, fig. 7), with pale band around middle, appears to be very similar, but with slightly fewer axial riblets and spiral striae: resp. *c.* 10, and 3-4, with 6 additional lirae on base. Probably only a casual variation. cf. also *Mangilia helena* Turton (1932. p. 28, pl. 6, no. 208).

*Philbertia capensis* (Smith)

Figs. 8 h, 29 b

1882. Smith. *Ann. Mag. Nat. Hist.* (5), x, p. 296.

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 6, pl. 4, fig. 84 (not good) (*Defrancia c.*).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 23 (*Mangilia c.*).

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 230 (*Clathurella c.*).

1925. id. *ibid.*, p. 231, pl. 40 (28), fig. 21 (*Pleurotomella ida*).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 24, pl. 5, no. 182 (*Mangilia c.*).

Protoconch  $3\frac{1}{2}$  whorls, diam. 0.4, alt. 0.5 mm., nucleus smooth, 1st whorl with faint oblique axial striae, next whorl with criss-cross microsculpture, last half whorl with a spiral keel in middle and a faint lira below. Postnatal whorls 6; 1st with 3 spiral keels, the upper one being the continuation of the keel on protoconch, and forming a prominent shoulder; a fine subsidiary lira may sometimes develop between 1st and 2nd keels (sometimes between other pairs; *v. infra*); base with 8-9(10) additional keels. Narrow sharp axial ribs 9-10 on early whorls, increasing to 11-12 on body whorl, sometimes to 13 or 14 on plump examples; intersections with spiral keels sharp-pointed, especially on the shoulder keel; on base ribs extend to columella, forming a lozenge-shaped reticulation (nodulose in worn specimens). Lip sinus deep, adjoining suture. Outer lip (when coinciding with formation of a rib) thickened, plicate within.

17 (minus protoconch)  $\times$  6.5 mm.

No operculum.

Buff, a (faint) darker band below middle of body whorl, or whole lower half of whorl brown.

Radula without basal membrane, *c.* 40 teeth, rather stout, shallowly grooved, margins thickened.

Kalk Bay to Port Alfred (previous records, and S. Afr. Mus.); St. Francis Bay, 80 metres (Thiele); 35° 19' S., 20° 12' E., 126 metres (Thiele: *P. ida*).

Off East London, 32 fathoms, and off Cove Rock, 27 fathoms; Algoa Bay, 36 fathoms; off Umhloti River (Natal), 47 fathoms; off Tugela River, 65–80 fathoms (S. Afr. Mus. P.F. Coll.).

Living: False Bay, 55 metres (U.C.T.).

There is a single specimen in S. Afr. Mus. from Table Bay, but the record is unreliable.

*Remarks.* The sulcus between suture and shoulder keel is nearly horizontal on the early whorls, but on later whorls slopes to a varying degree, consequently there are squat forms (U.C.T., TRA.133N) and elongate forms (S. Afr. Mus. A4952).

Two specimens from False Bay (FB.952.4.U.C.T.) differ slightly in appearance: the shoulder keel is less prominent and does not form the widest part of the whorl, the profile of which is thus more evenly convex from suture to suture.

In one of these two specimens the intermediate lira between the shoulder and peripheral keels becomes from about the half of the 3rd whorl as strong as the primary keels, so that on the 4th whorl there are 4 keels; also on 4th whorl the lira between suture and shoulder keel becomes a keel demarcating the sulcus, and another keel develops at the bottom of the whorl immediately above the suture, thus the profile of the 5th whorl shows 6 keels.

The development of these additional keels is, in my opinion, only a casual variation.

A 5 mm. long juvenile with 4 postnatal whorls, from Algoa Bay, indicates that *Pleurotomella ida* Thiele is the juvenile of *capensis*, although Thiele's figure shows only 2 spiral keels on 1st and 2nd whorls, and the 3rd whorl is a little ambiguous at the profile.

*Trophon ornatus* Turton (1932. p. 75, pl. 18, no. 544), 1 mm. long, is certainly the protoconch of this or an allied species.

'*Drillia fultoni* (Sow.)

Fig. 8 g

1888. Sowerby. *Proc. Zool. Soc. Lond.*, p. 210, pl. xi, fig. 17 (*Pleurotoma f.*).

1889. id. *J. Conch.*, vi, p. 7 (*Pleurotoma f.*).

1892. id. *Mar. Sh. S. Afr.*, p. 5 (*Pleurotoma (Drillia) f.*).

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 23 (*Drillia f.*).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 18 (*Turris f.*).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 18 (*Turris f.*).

Protoconch smooth (present only in one specimen in S. Afr. Mus., and not well preserved). Postnatal whorls 10–11. Three spiral keels, one below the upper suture, one in middle of whorl, and one above the lower suture; the uppermost keel not always well developed, more like a low cingulum than an upstanding keel; below the lowermost keel on base 4 smaller additional keels. Between middle and lower keels minute spiral striae which form a micro-



cancellate sculpture with the fine close-set growth-lines; cancellation distinct on base, but not in the sulcus. Periostracum hides the cancellation, and shows only close fine pleating, retractive between suture and middle keel, protractive below the latter. Columella with a slight swelling (not a pleat). Lip sinus remote from suture, adjoining the middle keel. 29 (minus protoconch)  $\times$  10 mm.

No operculum.

Yellowish or buff, with white keels, a narrow brown band immediately below suture, columella suffused, rostrum and edge of canal brown, periostracum pale buff.

Radula without basal membrane, 15 pairs of narrow, acicular teeth, slightly swollen in distal third, shallowly grooved, margins thickened.

Presumably dead: Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton). Dead: St. Francis Bay, 80–100 metres (von Martens).

Off Kowie (Port Alfred), 40 fathoms, dead; Algoa Bay, 37 fathoms, 1 fresh, 1 alive; off Cape St. Blaize, 39 fathoms, 1 fresh; off Cape Infanta, 46 fathoms, 1 broken apex (S. Afr. Mus. P.F. Coll.). False Bay, living (U.C.T.).

*Remarks.* The radula shows that this species has been entirely misplaced *conchologically*.

In general appearance there is a strong resemblance to the West African *Pleurotoma spiralis* Smith 1871, and Knudsen's description (1952. *Vid. Medd. Dansk. For.*, cxiv, p. 164, pl. 1, fig. 2) intensifies the likeness to such an extent that *fultoni* might be considered a synonym. But Knudsen places *spiralis* in *Asthenotoma*; thus presumably it has an operculum; *fultoni* has no operculum and therefore must go into a Cytharine genus.

'Drillia' *scitecostata* (Sow.)

Figs. 8 f, 20 (left)

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 214, pl. 4, fig. 10 (*Pleurotoma* (*Drillia*) s.).

1906. Smith. *Ann. Natal Mus.*, i, p. 25 (*Drillia* s.).

Protoconch 2 whorls, diam. and alt. 1.25 mm., smooth. Postnatal whorls 6. Oblique ribs slightly broader than the deep intervals, 14–15 on early whorls, increasing to 25–26 on last whorl; upper ends coronate, slightly projecting above the smooth sulcus, becoming obsolete on lower half of base. Base spirally lirate. Lip sinus rather broad, moderately deep, adjoining the suture. Columella nearly straight, canal short. 26  $\times$  8 mm.

No operculum. Buff.

Radula without basal membrane, c. 33 pairs of slender, acicular teeth, shallowly grooved nearly to apex, margins thickened.

Off Glendower Beacon (near Port Alfred), 100 fathoms (Sowerby). Type (presumably) and cotype in S. Afr. Mus.

Off East London, 80–130 fathoms, 3 dead, 1 alive; Algoa Bay, 56 fathoms, 2 dead; False Bay, 20 fathoms, 1 dead (S. Afr. Mus. P.F. Coll.).

*Remarks.* Like *fultoni* this species must be removed from *Drillia* on account of the absence of an operculum and the character of the radula.

False Bay specimen has only 21 ribs on the last whorl.

INCERTAE SEDIS—ANIMALS UNKNOWN

*Drillia hottentota* (Smith)

1882. Smith. *Ann. Mag. Nat. Hist.* (5), x, p. 208 (*Pleurotoma* (*Clavus*) *h.*).  
 1892. Sowerby. *Mar. Sh. S. Afr.*, p. 5, pl. 4, fig. 81.  
 1897. id. *Append. Mar. Sh. S. Afr.*, p. 3, pl. 8, figs. 1, 2 (*burnupi*).  
 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 21.  
 1921. Sowerby. *Proc. Mal. Soc.*, xiv, p. 127 (var. *fuscescens*).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 21, pl. 4, nos. 161, 162.  
 1932. id. *ibid.*, p. 21, pl. 4, no. 163 (*neptuni*).

*Drillia layardi* Sow.

1886. Sowerby. *J. Conch.*, v, p. 5 (*Pleurotoma castanea*, non Rve.).  
 1897. id. *Append. Mar. Sh. S. Afr.*, p. 2, pl. 8, fig. 3 (*Pleurotoma* (*Drillia*) *l.*).  
 1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 23.  
 1915. Bartsch. *loc. cit.*, p. 21.  
 1932. Turton. *loc. cit.*, p. 22.

S. Afr. Mus. has examples of both these 'species' identified by Tomlin. Unless some slip has occurred, there is a transition in colouring from typical *hottentota* (brown with white base, and brown with pale band) to the uniform brown var. *fuscescens* and *layardi*. Conchologically there are no differences, and therefore I propose to make *layardi* a synonym of *hottentota*.

Protoconch 2 whorls, diam. and alt. 1 mm., smooth but with *c.* 10 straight axial plicae on last half whorl; 1st postnatal whorl starts with oblique riblets. Postnatal whorls 5. Axial riblets on 1st whorl 10-11, increasing to 13-15 (16) on 5th whorl. In some specimens, both typical *hottentota* and *fuscescens-layardi*, some (not all) of the riblets cross the sulcus and reach or almost reach the suture (*burnupi*). Spiral striae absent except on the base (and here often visible only on the lower part). Occasionally on the lower part of the intervals between the ribs there are very faint indications of 2 (3) spiral striae.

Up to 18 mm. long (Turton).

False Bay to Port Alfred (previous records, and S. Afr. Mus.).

Off Cove Rock (East London), 22 fathoms, 1 dead but fairly fresh (brown: *fuscescens-layardi*); Algoa Bay, 10 fathoms, 1 dead (*hottentota* coloration). (S. Afr. Mus. P.F. Coll.)

*Remarks.* The absence of spiral striae distinguishes this species from *subcontracta*.

*D. burnupi*, 10 × 4 mm. with 8 [*sic*, = 2 + 6] whorls, was stated by Sowerby to be allied to *layardi*, but with the axial riblets running across the sulcus to suture. A very worn specimen in S. Afr. Mus. with only 3 whorls from Tongaat

(30 miles north of Durban) shows this character. It is dull yellowish with a brown band below the suture, and a very faint narrow white band below the brown, as in some examples of *hottentota*.

*Drillia ancilla* Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 228, pl. 37 (25), fig. 10.

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 29, pl. 6, no. 214 (*Mangilia innotabilis*).

Protoconch  $1\frac{1}{2}$  whorls, diam. and alt. 0.5–0.6 mm., smooth. Postnatal whorls 4. Axial riblets 9 on each whorl, oblique, crossing sulcus. No spiral striae. Lip sinus deep, adjoining suture, but with columella callus interposed when fully developed.  $4.75 \times 2.1$  mm.

$33^{\circ} 50' S.$ ,  $25^{\circ} 48' E.$ , and  $35^{\circ} 26' S.$ ,  $20^{\circ} 56' E.$ , no depth stated (Thiele). Port Alfred (Turton).

Off Cove Rock (East London area), 22 fathoms, 2 dead (S. Afr. Mus. P.F. Coll.).

*Remarks.* Agrees with *hottentota* and *falsa* in the absence of spiral striae, but seems to be a smaller species than either of these.

*Drillia subcontracta* Smith

1904. Smith. *J. Malac.*, xi, p. 26, pl. 2, fig. 2.

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 22.

1915. id. *ibid.*, p. 28, pl. 7, fig. 7 (*Mangilia herilda*).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 22.

1932. id. *ibid.*, p. 29, pl. 6, no. 215 (*Mangilia nereia*).

Protoconch  $1\frac{1}{2}$ –2 whorls, smooth (but worn). Postnatal whorls 6. Axial riblets 14–15 on 1st whorl, 13–14 on middle whorls, 15–16 on 5th and 6th whorls, more or less traceable across sulcus, petering out on base. Spiral striae over whole whorl, not crossing riblets (but no living specimens seen), 3–4 on sulcus, (8)9–10 below in intervals between riblets on last whorl, 12–15 additional stronger striae on base.  $12 \times 4.5$  mm.

Amber-brown, worn specimens with paler or white ribs.

Port Alfred (Smith, Bartsch, Turton, S. Afr. Mus.).

*Remarks.* The S. Afr. Mus. specimens were identified by Tomlin. The axial ribs are more numerous, and the spiral striae fewer than in *diversa* (Smith).

A specimen in S. Afr. Mus., identified by Tomlin as *herilda*, is a young *subcontracta* bleached white.

*Drillia diversa* (Smith)

1882. Smith. *Ann. Mag. Nat. Hist.* (5), x, p. 207 (*Pleurotoma (Clavus) d.*).

*Drillia bairstowi* (Sow.)

1886. Sowerby. *J. Conch.*, v, p. 6 (*Pleurotoma b.*).

1892. id. *loc. cit.*, p. 6, pl. 1, fig. 6.

*Drillia albonodulosa* Smith

1904. Smith. *J. Malac.*, xi, p. 27, pl. 2, fig. 3.

S. Afr. Mus. has 3 *diversa* (identified by Tomlin), 1 *bairstowi* (identified by Tomlin) and 3 topotypes of *albonodulosa*; all water-worn.

All specimens have 10 axial ribs on the whorls; the 5th whorl in *bairstowi* has 11; the body whorl in *albonodulosa* only 6 or 7, the last part of the whorl being ribless. In the latter the white mark on the ribs is continued as a white band on the smooth part, but it is superficial and not deep-seated.

Spiral striae over whole whorl, 5-6 on sulcus, 14-15 (or more) below (visible in worn specimens only between the ribs) and *c.* 15 stronger and more widely spaced striae on base.

Turton (1932, p. 22) says all three species are 'quite distinct': 'orange with faint ribs and dark colouring in between', 'white with dark reddish streaks between the ribs', and 'dark brown with a row of white nodules'. The same colouring expressed in different words, and referring to water-worn, not conchological, characters.

Possibly the actual types of these three 'species' may differ, but unless and until the conchological differences (if any) have been stated, the above synonymy is suggested.

See also *Clavatula halistrepta* Bartsch (*infra*, p. 140).

*Drillia rousi* (Sow.)

1886. Sowerby. *J. Conch.*, v, p. 6 (*Pleurotoma r.*).

1892. id. *Mar. Sh. S. Afr.*, p. 5, pl. 1, fig. 3 (bad) (*Pleurotoma r.*).

1906. Smith. *Ann. Natal Mus.*, i, p. 26, pl. 7, fig. 3 (not good) (*albotessellata*).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 16, pl. 4, fig. 1 (*Clionella elizabethae*).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 20, pl. 4, no. 154 (large specimen; ? not the juv.).

Axial ribs 9-10 on last 2 whorls, broad, rounded, shouldered or subcuspidate above, extending halfway across base on last whorl. Spiral striae 4-5 on last 2 whorls, and 5-6 additional on base, none on sulcus.

Sowerby: 20 × 8 mm. (4 whorls in fig.); Bartsch: 13 × 7 mm. (3½ whorls in fig.); Smith: 18 × 6 mm. (3 whorls in fig.). S. Afr. Mus.: 15 × 6 mm. (feebly shouldered), 15 × 7 mm. (strongly shouldered).

Port Elizabeth (Sowerby, Bartsch); Port Shepstone, Natal (Smith); Port Alfred (Turton).

*Remarks.* It seems clear that Sowerby, Bartsch and Turton have described and figured examples of one and the same species. Four topotypes of *albotessellata* (S. Afr. Mus. coll. Burnup) justify including this also as a synonym.

All four have only 3 whorls with portion of an earlier whorl, and Burnup's label says 'always decollated'; Sowerby's original description included the word 'decollata'. Smith's 'anfractus circiter 8' appears to be a misprint for 3, as shown in his figure.



Smith's figure is not good, as the profile of the whorls is evenly convex, without any prominent shoulder. It can, however, be nearly matched by one of the S. Afr. Mus. specimens. Two others have strong shoulders; one of them closely resembles Bartsch's figure, with the colour pattern shown in Turton's photograph. The fourth specimen has moderate shoulders.

Turton also figured a 3 mm. specimen stated to be a juvenile of *rousi*. It had protoconch 2 whorls plus 3 postnatal whorls, the 3rd whorl showing 4 axial ribs in face view; spiral striae not visible in the photograph. Presumably Turton had intermediate sizes connecting the juveniles with the decollated adults.

*Drillia omia* n. sp.

Fig. 11 a

S. Afr. Mus. No. A8651. Eleven specimens, locality ? Port Alfred. All more or less worn, uniform pale or dark brown, without any indication of a darker band.

Smallest 7 mm. long with protoconch plus 3 whorls, therefore not comparable with Turton's juvenile mentioned above under *rousi*; largest 10 mm. long with protoconch plus 4 whorls; none with parietal callus or lip sinus.

Profile strongly shouldered and convex below the slightly concave sulcus. Axial ribs broad, rounded, slightly protractive, 9-10 on 1st and 2nd whorls,

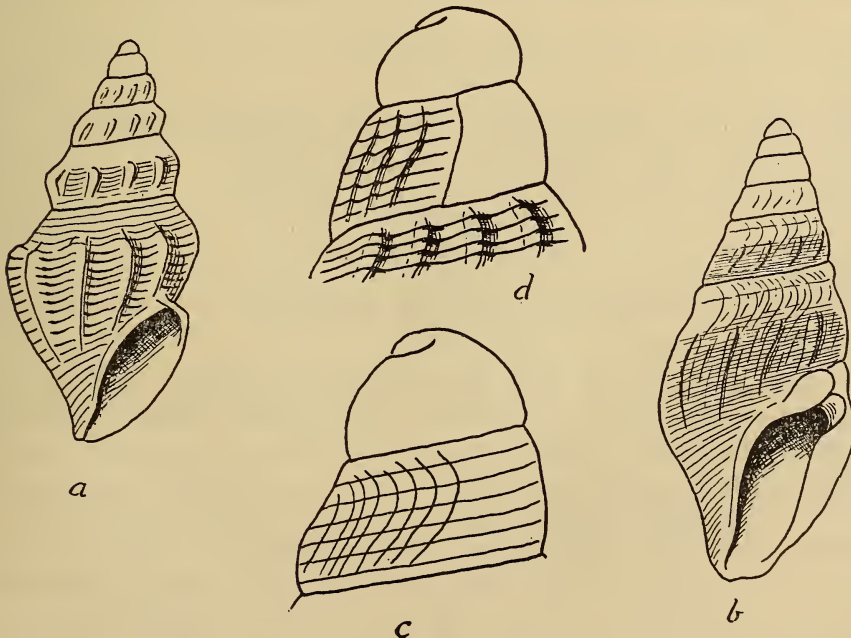


FIG. 11. a. *Drillia omia* n. sp. b. *D. sowerbyi* Turton. Protoconchs of: c. *D. caffra* (Smith). d. *D. thetis* (Smith).

10-11 on 3rd and 4th, extending halfway across base on body whorl; 4 spiral striae in sulcus on last whorl, 8 in the intervals between the ribs, and *c.* 12 additional on base (contrast *rousi*).

*Drillia sowerbyi* Turton

Fig. 11 b

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 22, pl. 4, no. 170.

Aperture  $1\frac{1}{4}$  in spire. Protoconch  $1\frac{1}{2}$  whorls, diam. 1 mm., smooth (worn). Postnatal whorls  $4\frac{1}{2}$ ; profile almost straight, a very slight convexity (cingulum) below suture, and a very slightly concave sulcus, remainder slightly convex. 10 feeble slightly oblique, protractive, axial ribs on 3rd whorl; body whorl with 6, thereafter obsolete. Whole whorl, including sulcus, with very fine close-set spiral striae, *c.* 15 on 2nd whorl, 20 on 3rd and 25-30 on 4th, *c.* 15 additional striae (slightly farther apart) on base. Parietal callus well developed, lip sinus deep.  $11 \times 4.5$  mm.

Buff, remains of periostracum dark brown. Turton: very dark brown.

Port Alfred (Turton). Off Cove Rock (East London), 22 fathoms, 1 dead (S. Afr. Mus. P.F. Coll.).

*Remarks.* This single specimen (A354) is slightly worn but corresponds so closely with Turton's figure that it can be referred to his species. Turton makes no mention of the spiral striae, and the figure scarcely shows them. His specimen was  $8 \times 3.5$  mm., with 2 plus 4 whorls (Turton reckoned 1 plus 5).

*Drillia caffra* (Smith)

Fig. 11 c

1882. Smith. *Ann. Mag. Nat. Hist.* (5), x, p. 209 (*Pleurotoma (Clavus) c.*).

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 6, pl. 4, fig. 80 (bad).

1904. Smith. *J. Malac.*, xi, p. 27, pl. 2, fig. 4 (*praetermissa*).

1904. id. *ibid.*, p. 27, pl. 2, fig. 5 (*nivosa*).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 21 (*Drillia c.*).

1915. id. *ibid.*, p. 22, pl. 2, fig. 4 (*lara*).

1931. Tomlin. *Ann. Natal Mus.*, vi, p. 440 (*Clionella c.*).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 20.

Aperture about  $1\frac{1}{4}$  in spire. Protoconch  $1\frac{1}{2}$ -2 whorls (junction with 1st postnatal whorl not clear), diam. and alt. 1 mm., smooth. Postnatal whorls 6; profile slightly concave at sulcus, convex below, widest at the shoulder above middle of whorl. Axial ribs oblique, 11-12 on early whorls, increasing to 15-18 on last whorl, most prominent at shoulder, not indicated on sulcus, petering out at middle on body whorl. No cingulum at suture, or only a very slight one. Fine spiral striae over whole whorl, 6 at start of 1st whorl, becoming numerous on following whorls, at least 30 on last whorl, in fresh specimens crossing the ribs. Lip sinus deep, with (in adult) parietal callus. Columella reflected at the short and broad canal.  $29 \times 9$  mm. (across shoulder).

Pale brown, mottled; beach specimens buff, pink, white, often a few dark spots below suture.

Port Elizabeth (Smith, Sowerby); Port Alfred (Bartsch, Turton).

Off Cape Natal (Durban), 55 fathoms, dead but fresh, and off Port Shepstone, Natal, 36 fathoms, 3 unicolorous pink, grey, white, dead, but 2 showing striae; off Umhloti River mouth, 40 fathoms, dead; off Cove Rock (East London) 80-130 fathoms, 2 dead, discoloured; off Nieca River (south of East London), 43 fathoms, 1 dead; off Glendower Beacon (Port Alfred), 66 fathoms, 2 dead (S. Afr. Mus. P.F. Coll.).

*Remarks.* Specimens from Port Alfred identified as *praetermissa* and *lara* indicate that both these are synonyms of *caffra*, and I would include also *nivosa*, as did Tomlin, 1931.

With profile similar to that of *subcontracta*, but far fewer spiral striae.

The two from the East London area have very strong auriculate and varicoid outer lips.

#### *Drillia thetis* (Smith)

Fig. 11 d

1904. Smith. *J. Malac.*, xi, p. 26, pl. 2, fig. 1.

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 22.

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 21, pl. 4, no. 164 (*pretiosa*).

1932. id. *ibid.*, p. 23, pl. 5, no. 175.

Aperture  $1\frac{1}{3}$ - $1\frac{1}{2}$  in spire. Protoconch  $1\frac{1}{2}$ -2 whorls, diam. and alt. 0.6 mm., smooth. Postnatal whorls 5; profile convex from suture to suture (no concave sulcus). Oblique axial ribs 11 on 1st whorl, increasing to 12-13 on last whorl, from suture to suture, obsolescent on base. Fine spiral striae 6-7 on 1st whorl, increasing to *c.* 25 (between sutures) on last whorl, crossing the ribs. No cingulum. Lip sinus deep, with parietal callus in adult. Columella reflected at short broad canal.  $10 \times 14$  mm. (incl. outer lip).

Port Alfred (Smith, Bartsch, Turton).  $33^{\circ} 3' S.$ ,  $27^{\circ} 57' E.$  (East London area), 32 fathoms, 2 dead but fresh; off Cove Rock (East London area), 80-100 fathoms, 3 dead (S. Afr. Mus. P.F. Coll.).

*Remarks.* A smaller species than *caffra* (compare protoconchs) and distinguished by the ribs starting at the suture above.

#### *Drillia platystoma* (Smith)

1877. Smith. *Ann. Mag. Nat. Hist.* (4), xix, p. 501 (*Pleurotoma* (*Clionella*) *p.*).

1889. Sowerby. *J. Conch.*, vi, p. 7, pl. 1, fig. 21 (*Pleurotoma wilkiae*).

1892. id. *Mar. Sh. S. Afr.*, p. 4, pl. 1, fig. 4 (*wilkiae*).

1892. id. *ibid.*, p. 5, pl. 4, fig. 82 (*platystoma*).

1903. Smith. *Proc. Mal. Soc.*, v, p. 363 (*Drillia p.*).

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 23 (*castanea*, non Rve.).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 18 (*Clionella* ? *p.*).



1923. Melvill. *Proc. Malac. Soc.*, xv, p. 168, pl. 5, fig. 13 (*Surcula macilenta*).  
 1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 212, pl. 35 (23), fig. 17 (*distincta*).  
 1931. Tomlin. *Ann. Natal Mus.*, vi, p. 438 (*macilenta*).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 23 (*platystoma* and var. *wilkiae*).

Aperture  $1\frac{1}{2}$  times in spire. Protoconch  $1\frac{1}{2}$ –2 whorls, diam. and alt. 1 mm. (or a little less), smooth, glossy, ending with an evenly curved plica preceded by 2 obscure ones (cf. fig. 12a). Postnatal whorls 7. Oblique ribs weak, 13–14 on body whorl. Close, fine spiral striae over whole whorl, slightly less distinct on sulcus, on last whorl 8–9 in sulcus, 12–13 below shoulder, and *c.* 24 additional striae on base.  $16 \times 5.5$  mm.;  $17 \times 5$  (*macilenta*).

Yellowish, fuscous, pale brown or buff.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); St. Francis Bay, 80–100 metres, several dead (von Martens).

Off Umhloti River mouth, 40 fathoms, 2 juv. dead; off Cape Natal (Durban), 62 and 85 fathoms, 3 dead; off Great Fish Point Lighthouse, 49 fathoms, 1 dead (S. Afr. Mus. P.F. Coll.).

*Remarks.* The Great Fish Point specimen seems to be an exact counterpart of the *Valdivia* specimen figured by Thiele, but even a trifle more slender. Its protoconch measures diam. and alt. 0.8 mm.

The Natal specimens were identified as *wilkiae* by Sowerby.

The oblique ribs vary in strength according to the condition of the shell: in unworn specimens they are obvious from the shoulder almost to bottom of whorl (*macilenta*), in worn specimens they are reduced to more or less conspicuous knobs at the shoulder (*platystoma* and *wilkiae*, as far as can be judged from Sowerby's 1892 feeble figures).

*Mangilia benjamini* Bartsch (*v. infra*) is a broader shell (width less than 3 in length), with more numerous whorls at a shorter length.

Cf. *Pleurotoma?* *paula* Thiele

Fig. 12 a

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 229, pl. 37 (25); fig. 2.

Two specimens are very similar to *platystoma*, but differ in having fewer spiral lirae.

Aperture  $1\frac{1}{2}$  in spire. Protoconch 2 whorls, smooth, glossy, ending with a distinct axial, evenly curved plica preceded by 2 feeble ones. Postnatal whorls 5. Twelve to fourteen very feeble oblique knobs traceable on 3rd to 5th whorls at the shoulder, which is slightly above middle of whorl. Spiral striae over whole whorl, 4 above shoulder on 2nd and 3rd, 5 on 4th and 5th whorls, 1–2 at shoulder visible between the knobs, 4 below shoulder on 2nd and 3rd, 5 on 4th and 5th whorls, 6 additional striae on base of same strength as those above, followed by 6 feebler ones; the intervening lirae flat; the lira between suture and first stria wider and stronger than those following, forming a slight cingulum. Growth-lines sigmoid, sometimes rather prominent, due possibly to surface wear



on either side of them. In places the striae are slightly punctate (or the lirae slightly beaded) at the intersections with growth-lines.  $11 \times 4$  mm.

Algoa Bay, depth not recorded, one; off Nanquas Peak (eastern part of Algoa Bay), 49 fathoms, one (S. Afr. Mus. A8591, P.F. Coll.).

*Remarks.* In the small (6.3 mm.) *Pleurotoma? paula* Thiele, from  $35^{\circ} 16' S.$ ,  $22^{\circ} 26' E.$ , 155 metres, similar prominent sigmoid growth-lines occur at regular

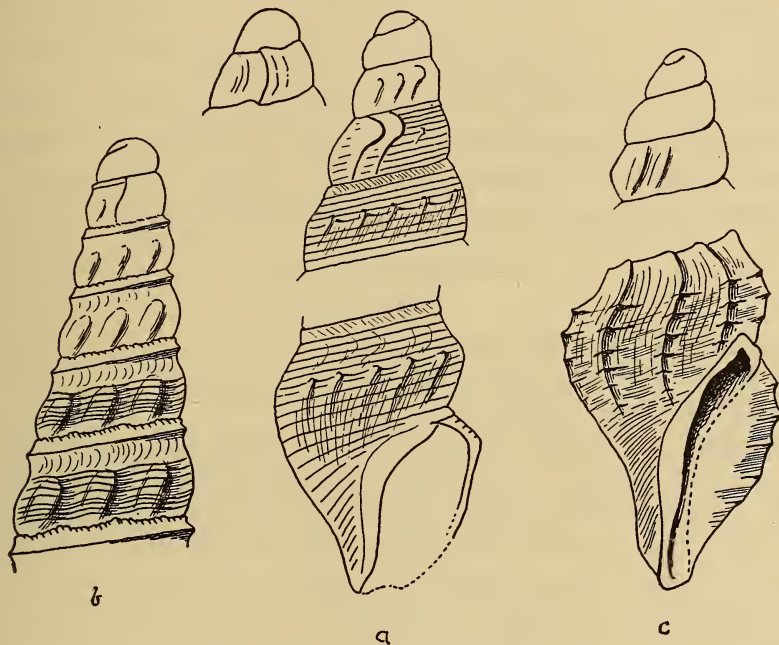


FIG. 12. *a.* *Pleurotoma? paula* Thiele, body whorl, apex and protoconch further enlarged. *b.* *Drillia flavidula* (Lam.), apex. *c.* *D. laterculoides* n. sp., body whorl and protoconch.

intervals on the 3 postnatal whorls, which are otherwise devoid of any sculpture. The *Valdivia* example was worn; possibly the present unworn specimens are conspecific.

A worn specimen resembling Thiele's specimen but consisting of only the 2-whorled protoconch plus one postnatal whorl was taken off Cape Recife ( $34^{\circ} S.$ ,  $25^{\circ} 44' E.$  (approx. 30 fathoms)). It measures  $3.25 \times 1.75$  mm., the protoconch alt. 1.25, diam. 1 mm. The postnatal whorl has 9 sigmoid axial grooves. (S. Afr. Mus. A8754, P.F. Coll.)

#### *Drillia variabilis* Smith

1877. Smith. *Ann. Mag. Nat. Hist.* (4), xix, p. 495.

1901. Melvill and Standen. *Proc. Zool. Soc. Lond.*, ii, p. 441.

1917. Melvill. *Proc. Mal. Soc.*, xii, p. 159, pl. 8, fig. 8.

Aperture  $1\frac{1}{2}$  times in spire. Protoconch missing. Postnatal whorls 10. Oblique axial ribs 8 on early, 12-13 on later whorls, extending over base nearly to canal. A feeble, narrow cingulum below suture, inconspicuously nodulose. Below sulcus 8-10 spiral lirae crossing ribs and grooves, slightly and irregularly nodulose, visible chiefly on base where there are *c.* 12 additional lirae, with finer intermediaries. Growth-lines rather distinct on body whorl, forming a semi-cancellate sculpture. Lip sinus broad, separated from suture by cingulum.  $32 \times 10$  mm.

Buff, with a few orange patches, and numerous orange spots on the cingulum and lirae. 'Freckled with pale brown' (Melvill).

Off Cape Vidal, Zululand, 22 fathoms, 1 dead (S. Afr. Mus. P.F. Coll.).

*Distribution.* Farquhar Island (S. Afr. Mus.); Persian Gulf, 6-15 fathoms; Karachi, 3 fathoms; off Bombay, 47 fathoms; Red Sea; Andaman Is.

*Remarks.* The Zululand specimen was identified by Sowerby.

*Drillia flavidula* (Lam.)

Fig. 12 *b*

1822. Lamarch. *Anim. sans Vert.*, vii, p. 92.

1843. Reeve. *Conch. Icon.*, i, pl. 8, fig. 66.

1917. Melvill. *Proc. Mal. Soc.*, xii, p. 152.

Slender, spire elongate, aperture  $1\frac{1}{4}$  in spire. Protoconch 2 whorls, smooth, diam. 0.75, alt. 0.8 mm., junction with 1st postnatal whorl distinct. Postnatal whorls 10 (as preserved). Oblique axial ribs 9 on 1st, 10 on 2nd, increasing to 12 on 10th whorl, rounded at shoulder, petering out on anterior half of base. Crossed by spiral lirae, 3-4 fine ones in sulcus, on ribs 4 (3 in early whorls) larger followed by 4 finer lirae; *c.* 15 additional lirae on base, with an intermediate between each of the upper 6 or 7 pairs. Cingulum present from 1st whorl onwards, forming a somewhat angular keel below and an irregularly crimped or beaded sutural margin above. Lip sinus moderately deep, situated in the sulcus. Growth-lines forming the sutural crimping but indistinct across cingulum and between the ribs, distinct in sulcus and on the base. Canal narrow (rostral point broken).  $29 \times 8$  mm.

Pale buff, no dark blotches visible between the ribs.

Off Tongaat River (Natal), 36 fathoms, 1 dead but unworn (S. Afr. Mus. P.F. Coll.).

*Distribution.* Red Sea, Persian Gulf, China.

*Remarks.* Melvill (p. 153) considered *flavidula* a variable species. The present specimen, described above, agrees with 2 Hong Kong examples (S. Afr. Mus. Ross Frames don.) but has a stronger cingulum and more conspicuous crimped sutural margin. The latter feature indicates *intertincta* Smith (cf. Gravely, 1942. *Bull. Madras Govt. Mus. n. s. Nat. Hist.*, v, 2, p. 75, in key), but the present shell is much more slender than Melvill's figure (1917. loc. cit., pl. 8, fig. 6), which shows moreover 3 spaced lirae crossing the ribs.

*Drillia laterculoides* n. sp.

Fig. 12 c

Aperture  $1\frac{1}{4}$  in spire. Protoconch 3 whorls, alt. 1, diam. 0.8 mm., smooth, junction with 1st postnatal whorl distinct in one specimen, not in the other. Postnatal whorls 7, profile convex with slight shoulder. Oblique axial ribs narrower than intervals, 10 on 1st whorl, 9 on each of the others, on 1st whorl the first 4 or 5 are closer together than the following ribs, crossing sulcus, petering out below periphery on base; spiral lirae obscure on first half of 1st whorl, 4 on second half, and on each succeeding whorl, distinct on ribs but obscure or obsolete in the intervals, 1st bounding the sulcus, 2nd peripheral, 4th almost concealed by following whorl; very fine spiral striae on sulcus and between main lirae; on base 2 additional lirae (on the ribs) and numerous fine striae. Growth-lines strongly sigmoid. Sulcus concave only in the intervals between ribs. Lip sinus deep, adjoining suture.  $17 \times 6$  mm. Buff.

Off Hood Point (East London area), 49 fathoms, dead, one complete and one apex (S. Afr. Mus. A8709, P.F. Coll.).

*Remarks.* Very similar to *Drillia laterculata* Sow. 1870 from China and N. Australia. Corresponds better with Watson's figure (*Challenger Rep.*, xv, pl. 18, fig. 5) than with Smith's figure (*Zool. H.M.S. Alert*, pl. 4, figs. E, E'), but the profile is more rounded; moreover Smith said the two (main) lirae are continuous between and across the ribs.

Similar also in shape to *variabilis*, but the axial ribs definitely cross the sulcus, reaching the suture above.

*Drillia collina* n. sp.

Fig. 13 a

Aperture  $1\frac{1}{2}$  in spire. Protoconch 2 whorls, smooth with median spiral lira in last half whorl. Postnatal whorls 5, profile convex. Axial ribs 9 on 1st whorl, increasing to 10-11 on last, retractive across sulcus, protractive below, narrower than intervals; crossed by spiral lirae 2 on 1st whorl, 3 on each of the others, the upper one in the sulcus, the middle one strongest and peripheral, 3rd stronger than 1st, one fine intermediary between 1st lira and suture, one between 2nd and 3rd lirae, one below 3rd; 8-9 additional fine lirae on base; complanate nodules at intersections of ribs and lirae. Growth-lines sigmoid. Sulcus not concave, with a subsutural lira forming a narrow but distinct cingulum. Lip sinus deep, adjoining suture.  $7 \times 2.8-3$  mm. Buff.

Off East London, 32 fathoms, one; off Hood Point (East London area), 49 fathoms, 2 and 2 apices; off Cape Natal (Durban), 85 fathoms, two (S. Afr. Mus. P.F. Coll.).

*Remarks.* The description is taken from the East London specimens (A8587, A8710); the Natal specimens (A8711) appear to be conspecific.



With some similarity to *Pleurotomella ida* Thiele, but distinctly narrower, and with ribs crossing the sulcus. Thiele's figure seems to indicate a cingulum, but it is not mentioned in the description.

Also rather like *Bellardiella alfredensis* Turton 1932, but the latter is only 4 mm. long with 4 whorls (figure; description says 5).

*Drillia bruchia* n. sp.

Fig. 13 b

A broken specimen consisting of three whorls, apex (? 2 or 3 whorls) missing.

Profile sharply angular. Axial ribs 11 on 1st two whorls, 12 on the last, scarcely indicated on sulcus except near the shoulder, petering out on lower part

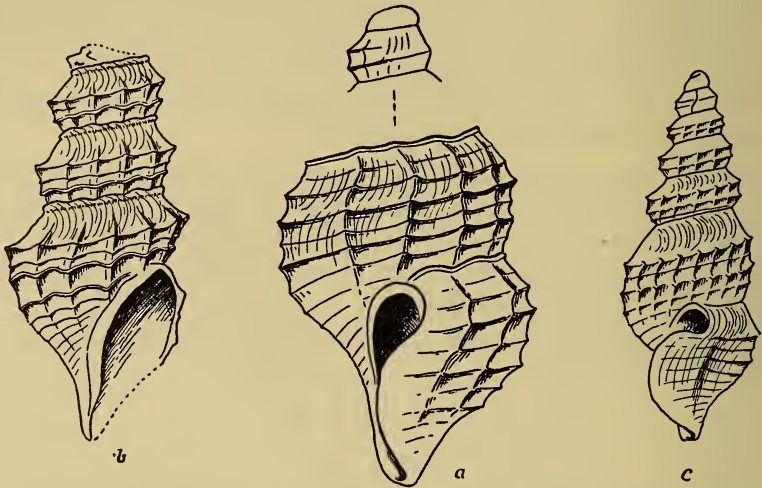


FIG. 13. a. *Drillia collina* n. sp. b. *D. bruchia* n. sp. c. *D. latisulcus* n. sp.

of base; crossed by 2 spiral lirae, with an intermediary beginning on later part of earliest whorl, continued on the two later ones, c. 12 additional lirae on base; lirae thin, forming sharp complanate nodules at intersections with ribs; sulcus with distinct narrow cingulum, crossed by growth-lines; lip sinus deep, adjoining suture.  $8 \times 3.5$  mm. Buff.

Off Cape Natal (Durban), 440 fathoms, one dead (S. Afr. Mus. A8717, P.F. Coll.).

*Remarks.* Although similar to *D. collina* (A8711, and A8587, A8710), this specimen is distinguished by the better marked cingulum, absence of lirae in the sulcus, and the axial ribs not crossing the sulcus.

*Drillia tholos* n. sp.

Fig. 14

Aperture subequal to spire. Protoconch  $2\frac{1}{2}$  whorls, dome-like, 0.3–0.4 alt., diam. 0.7–0.8 mm., apex smooth, 5–6 feeble close-set axial pliculae on last



quarter, glossy. Postnatal whorls  $3-3\frac{1}{2}$ , profile convex with slight rounded shoulder. Axial ribs 13 on 1st, 11-12 on 2nd and 3rd whorls, crossing sulcus and extending halfway across base; narrow, sharp; crossed by narrow, sharp spiral lirae 2 on beginning of 1st whorl, increasing to 3, 5 on 2nd and 3rd, the uppermost in the sulcus, the second forming the shoulder, forming tiny points at intersections with ribs; *c.* 12 additional lirae on base. Growth-lines fine, forming, with extremely fine spiral striae, a microcancellate sculpture. Lip sinus moderate, adjoining suture.  $5 \times 2$  mm. Pale brown.

Off Hood Point (East London area), 49 fathoms, 14 dead; off Cape Natal (Durban), 11 dead (S. Afr. Mus. A8735, A8759, P.F. Coll.).

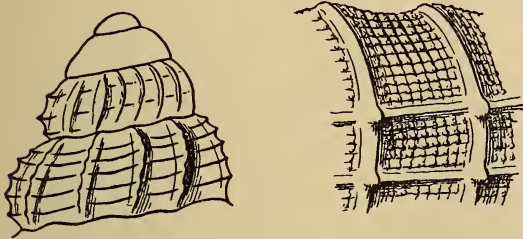


FIG. 14. Protoconch and 1st postnatal whorl of *Drillia tholos* n. sp., with portion of upper part of last whorl further enlarged.

*Remarks.* There is no clear distinction between protoconch and first post-natal whorl except a rather more conspicuous riblet; some of the 5 or 6 pliculae may belong to the 1st postnatal whorl.

Most of the specimens are about  $3.75 \times 1.75$  mm.

Distinguished from *Glyphostoma siren* Smith by the microcancellate sculpture, and from

*Mangilia shepstonensis* by the non-tabulate axial ribs.

*Drillia latusculus* n. sp.

Fig. 13 c

Aperture  $1\frac{1}{3}-1\frac{1}{2}$  in spire. Protoconch 2 whorls, diam. and alt. 0.5 mm. smooth. Postnatal whorls 5, profile convex with slight shoulder. Axial ribs (below shoulder) 11 on 1st whorl, increasing to 13-14, but evanescent on last part of last whorl; crossed by spiral lirae 2 on 1st, 2nd and 3rd whorls, 2 and a fine 3rd near lower suture on 4th whorl, 3 on 5th, the lowest fine, also an intermediary between 1st and 2nd lirae, at least 12 additional lirae on base; slight complanate nodules at intersections. Growth-lines fine; sulcus rather wide, scarcely concave, no cingulum, without spiral lirae and not crossed by the ribs. Lip sinus deep, adjoining suture. Outer lip submarginally incrassate.  $6.5-7 \times 2.3-2.5$  mm. Pale brown.

Off Tugela River (Zululand), 65-80 fathoms, one; off Tongaat River (Natal), 36 fathoms, one; off Umhloti River (Natal), 40 fathoms, two; off Illovo River (Natal), 27-30 fathoms, one; off Cape Natal (Durban), 54 fathoms, 3 dead; off Cape Morgan, 47 fathoms, three; off Hood Point (East London area), 49 fathoms, six (S. Afr. Mus. A8718-A8723, A8760, P.F. Coll.).

*Remarks.* In some of the specimens the intermediary lira between the 1st and 2nd main lirae becomes as strong as the others on 4th and 5th whorls,

noticeably so in the Tugela River specimen and one of the Cape Morgan specimens.

In one of the Hood Point specimens and the Tugela River specimen the axial ribs are broader and do not exceed 12 in number.

The figured specimen is one of the Hood Point lot (A8718), which may be regarded as type material.

*Drillia perfluans* n. sp.

Fig. 15 a

Aperture  $1\frac{1}{2}$  in spire. Protoconch  $1\frac{1}{2}$  whorls, diam. and alt. 0.75 mm., smooth, glossy, junction with 1st postnatal whorl distinct. Postnatal whorls 4.

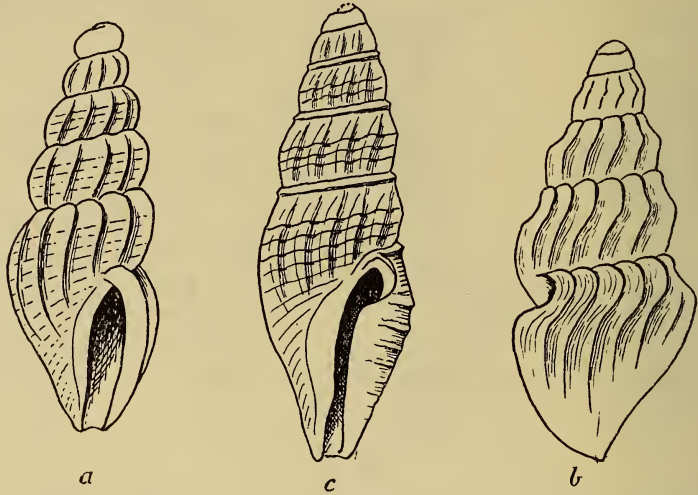


FIG. 15. a. *Drillia perfluans* n. sp. b. *D. falcicosta* n. sp. c. *D. oneili* n. sp.

Axial ribs 11 on 1st and 2nd whorls, 11-12 on 3rd, 12 on 4th, crossing (*perfluans*) sulcus; crossed by very faintly impressed spiral striae 3 on 2nd, 4 on 3rd, 5 on 4th whorl, the first at shoulder; about 12 additional striae on base, obscure in upper part, more distinct on lower part. Sulcus with one fine stria below suture, and one or two others very obscure near shoulder on last whorl. Lip sinus deep, adjoining suture.  $5.75 \times 2.3$  mm. Pale buff.

Off Hood Point (East London area), 49 fathoms, one dead (S. Afr. Mus. A8716, P.F. Coll.).

*Drillia falcicosta* n. sp.

Fig. 15 b

Aperture slightly less than spire. Protoconch 2 whorls, alt. 0.5, diam. 0.75 mm., smooth, glossy, junction with 1st postnatal whorl distinct. Postnatal whorls 3, profile convex with very slight shoulder. Axial ribs 11-12 on 1st, 12-13 on 2nd, 13-15(16) on 3rd whorl, narrow, sharp, crossing sulcus and slightly enlarged or raised at suture, slightly enlarged at shoulder but not

nodular; extremely fine and faint spiral striae between ribs, chiefly visible in the sulcus near suture; upper part of base smooth, lower part with 6-7 lirae; sulcus slightly concave between ribs; lip sinus deep, adjoining suture.  $6 \times 2.5$  mm.; both the Zululand specimens slightly larger, with  $3\frac{1}{2}$ -4 whorls:  $7 \times 3$  mm. Pale buff.



Off Umhloti River (Natal), 40 fathoms, 2 unworn and one apex; off O'Neil Peak (Zululand), 90 fathoms, 2 worn (S. Afr. Mus. A8724, A8725, P.F. Coll.).

Described from the unworn Natal specimens (A8724).

*Drillia morgana* n. sp.

Fig. 16



FIG. 16. *Drillia morgana* n. sp., with protoconch further enlarged.

Aperture  $1\frac{1}{3}$  in spire. Protoconch 2 whorls, nucleus depressed, alt. 0.8, diam. 1 mm., smooth, junction with 1st postnatal whorl distinct. Postnatal whorls  $3\frac{1}{2}$ , profile evenly convex, sutures rather deep. Axial ribs 15-16 on 1st, 19 on 2nd, c. 25 on 3rd whorl, narrow, not conspicuous, on last whorl sometimes coalescent (making an exact count difficult), crossing the undefined sulcus. No spiral sculpture except c. 10 lirae on lower part of base.  $7.5 \times 3$  mm. Creamy white.

Off Cape Morgan, 47 fathoms, one dead (S. Afr. Mus. A8739, P.F. Coll.).

*Drillia oneili* n. sp.

Fig. 15 c

Aperture slightly less than spire (protoconch incomplete). Protoconch 2 whorls, apex corroded (but only the nucleus seems to be missing), smooth. Postnatal whorls 4, profile convex, scarcely any shoulder. Axial ribs 11 on 1st whorl, 12 on 2nd and 3rd, 13 on 4th, slightly oblique, rounded, about as broad as intervals, crossing sulcus but not the cingulum, petering out on base; crossed by narrow spiral lirae (on 1st whorl?), 2 on 2nd, 3 on 3rd and 4th, c. 14 additional lirae on base; in addition very fine spiral lirae over whole whorl, c. 6 in sulcus on 4th whorl. Sulcus not concave, with narrow but distinct cingulum. Lip sinus deep, adjoining suture. Growth-lines very faint, not forming any cancellation with the lirae.  $6.5 \times 2$  mm. Pale buff.

Off O'Neil Peak (Zululand), 90 fathoms, one slightly worn (S. Afr. Mus. A8731, P.F. Coll.).

*Drillia pleonastica* n. sp.

Fig. 17 a

Aperture slightly less than spire. Protoconch  $1\frac{1}{2}$  whorls, alt. 0.75, diam. 1 mm., smooth, junction with 1st postnatal whorl not distinct. Postnatal whorls



4, profile with slight peripheral angle. Spiral lirae 3 on first half of 1st whorl, middle one the most prominent and continued slightly below middle of whorl as the peripheral lira on succeeding whorls; above peripheral lira 4 lirae on 2nd whorl, 6 on 3rd, 7-8 on 4th; below periphery 2 on 2nd, 3 on 3rd, 4-5 on 4th whorl; *c.* 15 additional lirae on base. No axial ribs, but growth-lines distinct, strongly sigmoid, producing a cancellate sculpture on the sulcus, and a

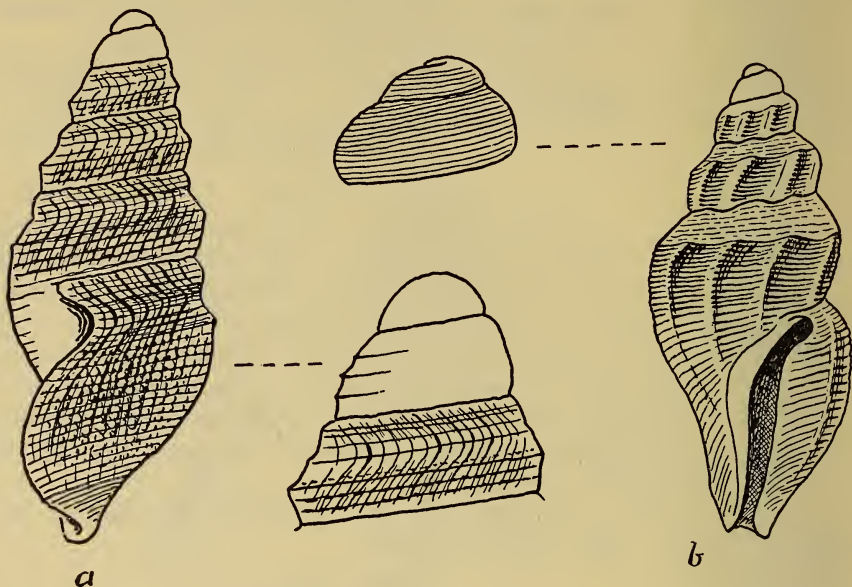


FIG. 17. *a.* *Drillia pleonastica* n. sp. *b.* *D. spiralis* n. sp. Protoconchs further enlarged.

beaded sculpture below periphery and on base. Lip sinus deep, remote from suture.  $7 \times 2.5$  mm. Pale buff.

$34^{\circ} 26' S.$ ,  $25^{\circ} 42' E.$ , 124 fathoms, one dead (S. Afr. Mus. A8565, P.F. Coll.).

*Drillia spiralis* n. sp.

Fig. 17 *b*

Aperture subequal to spire. Protoconch  $2\frac{1}{2}$  whorls, very finely spirally striate. Postnatal whorls 3, profile convex, with slight but definite shoulder. Obliquely protractive axial ribs 10 on 1st whorl, 9 on 2nd and 3rd whorls, traceable across base, not crossing sulcus; crossed by spiral lirae (below sulcus) 6 on 1st whorl, *c.* 10 on 2nd, *c.* 12-14 on 3rd, additional lirae on base at least 20; sulcus scarcely concave, with 4 spiral lirae on 2nd whorl, 6 on 3rd. Lip sinus deep, adjoining suture.  $7 \times 2.5$  mm. Buff.

Off Cape St. Blaize, 125 fathoms, one dead (S. Afr. Mus. A8583, P.F. Coll.).



*Remarks.* Differs from *Haedropleura dora* Thiele (see *Cythara alfredi*) by the more prominent shoulder, less prominent ribs on last whorl, and the ribs not crossing the sulcus.

*Drillia fossata* Sow.

Fig. 18 a

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 214, pl. 3, fig. 5 (*Pleurotoma (Drillia) f.*).

Aperture subequal to spire. Protoconch 2 whorls, diam. and alt. 1 mm., smooth. Postnatal whorls 6. First whorl with 14 short oblique ribs, broader than intervals, increasing to 30 on body whorl, forming a sharp, coronate or undulate keel above, bounding the deeply concave sulcus; on middle whorls

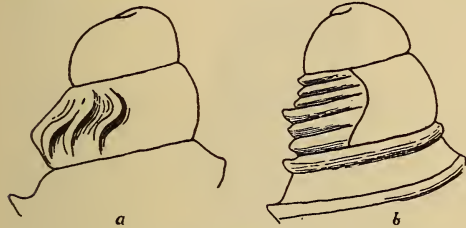


FIG. 18. a. *Drillia fossata* Sow. b. *D. simplicicingula* n. sp., protoconchs

the ribs cross the 1st and more or less the 2nd spiral lirae, but on later whorls peter out below, and on body whorl are scarcely indicated even on 1st lira. 2-3 strong, spaced spiral lirae below keel, and c. 10 additional ones on base; lirae in profile tabulate above, sloping below. Lip sinus deep, adjoining suture. 21×6.5 mm.

(Sowerby: 22×7 mm.).

Pale buff, the markings on the type described by Sowerby now faded.

Off Cape Vidal, Zululand, 80-100 fathoms (Sowerby). Type (with Sowerby's label) (fresh) and cotype (dead) in S. Afr. Museum, also broken apices of 4 examples and fragments of others; off Cape Natal, 85 fathoms, fragments; off Hood Point (East London), 49 fathoms, 5 broken apices; 34° 3' S., 25° 10' E. (St. Francis Bay), 24-34 fathoms, 1 dead but fresh (S. Afr. Mus. P.F. Coll.).

*Remarks.* The presence of a specimen in fresh condition as far west as St. Francis Bay is very surprising. There were no fragments of any other examples in the bottom-sample (dredged March 1899), as there were in the Cape Vidal sample (Febr. 1901) from which the type and cotype had been originally picked out. The Cape Natal (Dec. 1900) and Hood Point (July 1901) samples contained only fragments.

*Drillia simplicicingula* n. sp.

Fig. 18 b

Similar in shape to *fossata*. Aperture equal to spire. Protoconch 1½ whorls, diam. and alt. 1 mm., smooth. Postnatal whorls 4; 1st sharply demarcated from protoconch, with 6 spiral lirae, of which the uppermost continues on all whorls as a sharp keel below the suture, the 2 lirae below this (in the sulcus) soon disappear, the lower 3 continue on to 2nd whorl; on 3rd whorl 4 lirae below sulcus, on last whorl 7, with c. 15 additional ones on base; lirae in profile

tabulate above, sloping below (as in *fossata*). Lip sinus broad and deep, separated from suture by the subsutural keel.  $13 \times 5$  mm.

Pale buff, columella orange-brown, in one specimen aperture internally pinkish, protoconch glossy.

Off Hood Point (East London), 49 fathoms, 2 dead but unworn, 1 broken; off Sandy Point (Cape Morgan, East London area) 57 fathoms, 1 dead but unworn; off Cape Morgan, 47 fathoms, one and 2 fragments; off Great Fish

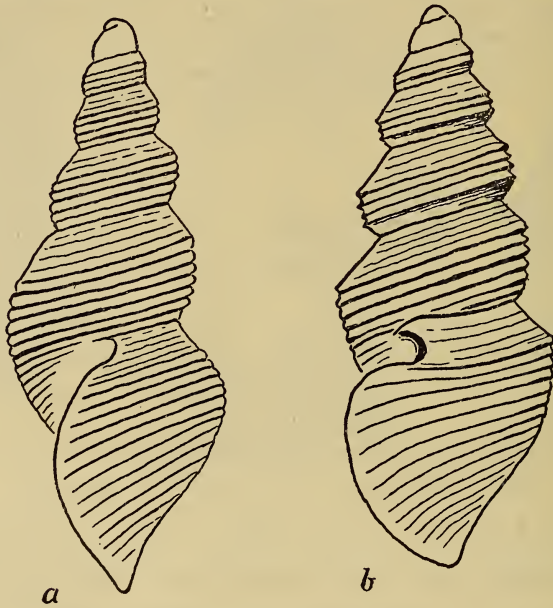


FIG. 19. a. *Drillia dolorosa* Thiele. b. *D. diasi* n. sp.

Point, 51 fathoms, 1 broken ((S. Afr. Mus. A3471, A8666, A8667, A8708, P.F. Coll.).

*Remarks.* Differs from *fossata* by the complete absence of any axial ribs, and by the different spiral sculpture.

The largest specimen (A8666, Hood Point) may be taken as the type; the smaller Sandy Point specimen (A3471), also with 4 whorls but only  $10 \times 4$  mm., as a cotype. The broken Great Fish Point specimen had 5 postnatal whorls.

#### *Drillia lea* Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 226, pl. 37 (25), fig. 5.

Protoconch  $1\frac{1}{2}$  whorls, smooth. Postnatal whorls 4 (6 mm. shell),  $5\frac{1}{2}$  (8 mm. shell). Spiral lirae 3 on 1st whorl, increasing to 5 on 4th and 6-7 on 5th, 15-20 additional lirae on base of 5th whorl. No axial riblets, growth-lines indistinct. Sulcus  $\frac{1}{3}$  length of whorl. Lip sinus deep, adjoining suture.

6 × 2.5 mm. (4 whorls), 8.5 × 3.5 mm. (fragment: 2nd–5th whorls); Thiele: 8 × 3 (5½ whorls).

35° 16' S., 22° 26' E., 155 metres (Thiele). 34° 26' S., 25° 42' E., 124 fathoms, one; and off Cape St. Blaize, 125 fathoms, one and one fragment (S. Afr. Mus. A8567, A8582, P.F. Coll.).

*Remarks.* Like the *Valdivia* specimens, the P.F. specimens from bottom samples are corroded, and the spiral lirae rather difficult to count.

Another specimen (A8585) from the same bottom sample off Cape St. Blaize is distinctly broader than typical *lea*, and has only 2 spiral lirae on the 1st and 2nd whorls, 3 on 3rd, and 4 on 4th, with 2 very fine intermediaries. 6 × 2.75 mm.

*Drillia dolorosa* Thiele

Fig. 19 a

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 227, pl. 37 (25), figs. 6, 6a.

Protoconch 2 whorls, diam. 0.6 mm., smooth. Postnatal whorls 4 (Thiele: 4½), profile convex, shoulder not prominent. No axial ribs. Spiral lirae (below sulcus) 3 on 1st whorl, 4 on 2nd, 5 on 3rd and 6 on 4th, *c.* 15 additional lirae on base, very faint towards extremity. Growth-lines obscure. Sulcus scarcely concave, with 2 fine spiral lirae on 2nd whorl, 3–4 on 3rd and 4 on 4th. Lip sinus deep, adjoining suture. 7.3 × 2.75 mm.; Thiele: 10.6 × 3.5 mm. Pale buff.

35° 16' S., 22° 26' E., 155 metres (Thiele).

Off East London, 32 fathoms, one dead (S. Afr. Mus. A8588, P.F. Coll.).

*Drillia diasi* n. sp.

Fig. 19 b

Aperture 1¼ in spire. Protoconch 2 whorls, diam. and alt. 0.75 mm., smooth. Postnatal whorls 4. No axial ribs. Spiral lirae (below sulcus) 2 on 1st whorl, 3 on 2nd, 4 on 3rd, becoming 5 on the later part, 5 on 4th, at least 15 additional lirae on base, faint towards extremity. Growth-lines fine. Sulcus broad, nearly ½ length of whorl, scarcely concave, with fine spiral lirae, 4 on body whorl. Lip sinus deep, adjoining suture. 9 × 3.75 and 6 × 2.5 mm. Creamy white.

34° 26' S., 25° 42' E., 124 fathoms, two dead (S. Afr. Mus. A8566, P.F. Coll.).

*Remarks.* Close to *lea* but with a broader sulcus, a slight but definite shoulder, and a larger protoconch; has only 3 whorls at same length as *lea* with 4 whorls.

*Drillia armilla* n. sp.

Protoconch 2½ whorls, diam. 0.75 mm., smooth. Postnatal whorls 4, profile convex, without shoulder. No axial ribs. Spiral lirae 3 on 1st whorl, 3 on 2nd becoming 4 on later part, 4 on 3rd becoming 5 on later part, 5 on 4th whorl, 18–20 additional lirae on base. Growth-lines very fine, subordinate to



the lirae. Sulcus  $\frac{1}{3}$  length of whorl, scarcely concave, with fine spiral lirae 2 on 1st and 2nd whorls, 3 on 3rd and 4th. Lip sinus deep, adjoining suture. Outer lip submarginally incrassate.  $7.5 \times 3.5$  mm. Buff.

Off Cove Rock (East London area), 80–130 fathoms, one dead (S. Afr. Mus. A8714, P.F. Coll.).

*Remarks.* Similar to *lea* but proportionately broader; the larger protoconch also indicates a different species. The lirae are sharply defined and well separated, without intermediaries.

Close to *diasi* but whorls more convex.

*Drillia pselia* n. sp.

Aperture subequal to spire. Protoconch 2 whorls, diam. 1 mm., smooth. Postnatal whorls 4, profile convex. Spiral lirae 2 on first quarter of 1st whorl, 3 on remainder, 3 on 2nd, 4 on 3rd, and by duplication and interpolation 6 on last whorl; slight thickenings or nodules appear on the lirae on 2nd and 3rd whorls, but there are no definite axial ribs; at least 25 fine additional lirae on base. Growth-lines for the most part obscure. Sulcus about  $\frac{1}{3}$  length of whorl, with 2 spiral lirae on 1st whorl, 3 on 2nd, 4 on 3rd and 4th. Lip sinus deep, adjoining suture.  $11 \times 4.5$  mm. Buff.

Off Cape St. Blaize, 125 fathoms, one and 2 broken specimens (S. Afr. Mus. A8715, P.F. Coll.).

*Remarks.* A species with sculpture similar to that of *lea* but larger, and with larger protoconch.

*Drillia (Cymatosyrinx) eva* Thiele

Fig. 20 (right)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 228, pl. 37 (25), fig. 9.

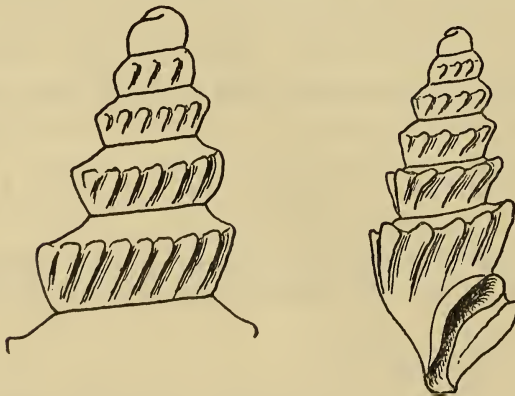


FIG. 20. Right: *Drillia eva* Thiele. Left: apex of '*Drillia*' *scitecostata* (Sow.), to same scale.

Aperture  $1\frac{3}{4}$  in spire. Protoconch  $1\frac{1}{2}$  whorls, diam. 0.5, alt. 0.6 mm., smooth, polished. Postnatal whorls 5. Broad oblique axial ribs, wider than the deep intervals, 12 on last whorl, upper ends becoming increasingly prominent forming a coronate shoulder. No spiral sculpture. Sulcus deeply concave. Lip sinus deep, adjoining suture.  $7 \times 2.5$  mm. (Thiele and S. Afr. Mus.).

$35^{\circ} 16' S.$ ,  $22^{\circ} 26' E.$

155 metres (Thiele). Off

Cape St. Blaize, 125 fathoms, 1 dead (S. Afr. Mus. A8561, P.F. Coll.).



*Remarks.* At first sight the sculpturing suggests a young *scitecostata*, but the protoconch is smaller and the shell narrower.

*Bela alma* Thiele

Fig. 21 a

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 227, pl. 37 (25), fig. 13.

Aperture  $1\frac{1}{2}$  in spire. Protoconch 2 whorls, smooth, last half whorl with median spiral lira. Postnatal whorls 4. Axial ribs slightly oblique below sulcus, c. 10 (obscure) on 1st whorl, 12 on 2nd, 15-16 on last whorl; crossed by spiral lirae on each whorl, feeble knobs at intersections, on body whorl an additional lira at top of base with small knobs, below which the ribs cease; 9-10 fine additional lirae on base. Growth-lines obscure. Sulcus not concave, not crossed by the ribs, no cingulum. Lip sinus deep, adjoining suture.  $7 \times 2.5$  mm. Pale brown.

$35^{\circ} 26' S.$ ,  $20^{\circ} 56' E.$ , depth not recorded (Thiele).

Off Illovo River (Natal), 27-30 fathoms, one; off Tugela River (Zululand), 65-80 fathoms, two (S. Afr. Mus. A8712, A8713, P.F. Coll.).

*Remarks.* Thiele does not mention the actual number of spiral lirae and axial ribs; his figure shows 4 noduliferous lirae on body whorl. In spite of this the present specimens, which agree in dimensions, may be provisionally referred to his species.

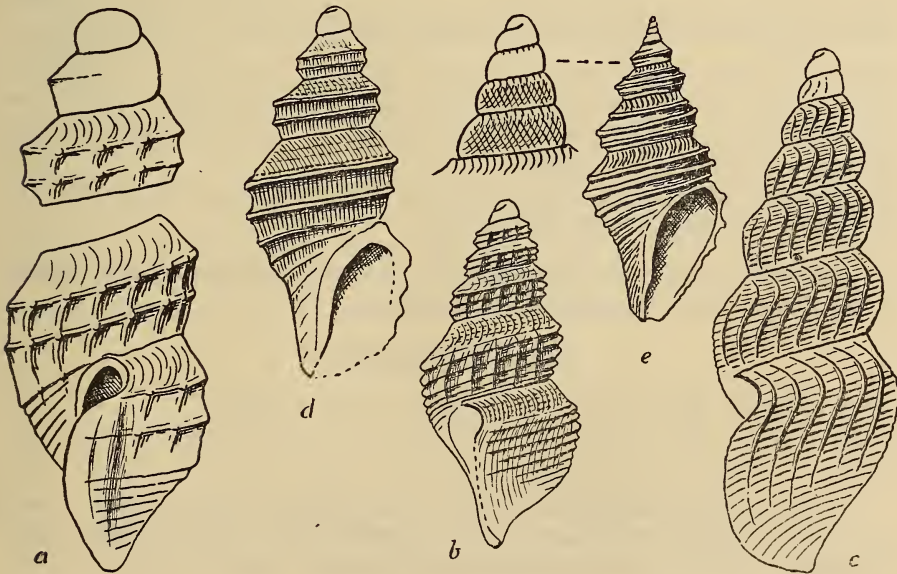


FIG. 21. a. *Bela alma* Thiele, with protoconch. b. *B. anna* Thiele. c. *B. bella* n. sp. d. *Asthenotoma eva* (Thiele). e. *Acrobela acus* n. sp., with protoconch.

*Bela anna* Thiele

Fig. 21 b

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 228, pl. 37 (25), fig. 14.

Aperture  $1\frac{1}{2}$  in spire (Thiele's figure:  $1\frac{1}{4}$ ). Protoconch  $1\frac{1}{2}$  whorls, diam. 0.5 mm., smooth (corroded). Postnatal whorls 4 (shell 6 mm.), Thiele:  $5\frac{1}{4}$  (shell 10.5 mm.), profile convex with slight shoulder. Axial ribs below shoulder low and rounded, 13 on 1st and 2nd whorls, 15 on 3rd, slightly curved and protractive, becoming obscure on 4th whorl; crossed by spiral lirae 2 on 1st whorl, the upper forming the shoulder, increasing to 5 on 4th whorl (Thiele's figure: 6 or 7 on 5th whorl), *c.* 7 additional lirae on upper part of base (lower part corroded); growth-lines distinct.  $6 \times 2.5$  mm.; Thiele:  $10.5 \times 4$  mm. Buff.  $35^\circ 16' S.$ ,  $22^\circ 26' E.$ , 155 metres (Thiele).

Off Cape St. Blaize, 125 fathoms, one dead (S. Afr. Mus. A8584, P.F. Coll.).

*Remarks.* The *Pieter Faure* specimen seems to be identical with, though smaller than, the *Valdivia* one.

*Bela bella* n. sp.

Fig. 21 c

Aperture  $1\frac{1}{2}$  in spire. Protoconch 2 whorls, diam. 0.75 mm., smooth (corroded). Postnatal whorls 5, profile convex with slight shoulder. Growth-lines forming narrow, sharp axial ribs 14-15 on 1st whorl (more or less corroded), increasing to 20-22 on body whorl, strongly curved in sulcus, protractive below; spiral lirae below sulcus 4 on 1st and 2nd whorls, 4-5 on 3rd, 6-7 on 4th and 7-8 on 5th, *c.* 15 additional lirae on base; sulcus scarcely concave, with 2 lirae on 2nd whorl, 3 on 3rd, 3-4 on 4th and 4 on 5th. Lip sinus deep, adjoining suture.  $10 \times 3.5$  mm. Pale buff.

Brown's Bank (approx.  $36\frac{1}{2}^\circ S.$ ,  $21^\circ E.$ ) on Agulhas Bank, 80-100 fathoms, 3 dead (S. Afr. Mus. A8639, P.F. Coll.).

*Remarks.* Somewhat resembling *anna*, but distinguished by the sharper, more oblique axial ribs, which cross the sulcus.

*Clavatula halistrepta* Bartsch

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 19, pl. 2, fig. 5.

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 19, and var. *albocincta*, pl. 4, no. 149.

1932. id. *ibid.*, p. 19, pl. 4, no. 150 (*hera*).

One very worn topotype Port Alfred (ex Turton), in S. Afr. Mus. I have seen one specimen from Jeffrey's Bay agreeing with Bartsch's description: 6 whorls.  $28 \times 10$  (across outer lip) mm., aperture 12 mm.

Although larger there are sculptural resemblances between this and *Drillia diversa* (Smith).

*Clavatula semicostata* Kiener

## Fig. 5f

1848. Krauss. *Südafr. Moll.*, p. 109.  
 1892. Sowerby. *Mar. Sh. S. Afr.*, p. 6.  
 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 17.  
 1915. id. *ibid.*, p. 23, pl. 2, fig. 9 (*Drillia halidoma*).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 15.

Not: Von Martens. 1903. *D. Tiefsee Exp.*, vii, p. 24.  
 Thiele. 1925. *ibid.*, xvii, p. 212, pl. 35 (23), fig. 10. } = *lignaria*.

Aperture  $1\frac{1}{2}$  to nearly 2 in spire. Protoconch ? Postnatal whorls 9 (10). Oblique axial ribs 11-12 on early whorls, 13-14 on later whorls, beginning at suture, on body whorl extending halfway across base, shoulder slightly *above* middle of whorl; suture embracing lower ends of ribs, producing a more or less nodular cingulum; sulcus rather deeply concave; fine spiral striae, close together on sulcus, farther apart below, 4 on early whorls, increasing to about 10 on later whorls, usually visible only in the grooves between ribs. Lip sinus deep and narrow, a little distance from suture.  $48 \times 15$  mm.

White or pinkish, periostracum yellow-brown.

Cape (Krauss, Bartsch); Port Alfred (Turton). Durban, Port St. Johns, Hermanus, Kalk Bay (False Bay), and False Bay, 9 fathoms (S. Afr. Mus.).

*Remarks.* The Durban and the 48 mm. False Bay specimens are fresh and retain the periostracum.

Bartsch's 18.6 mm. *halidoma* can be matched with juvenile shells in S. Afr. Museum.

Bergh (1895. *Nov. Act. K. Leop-Carol. D. Ak. Naturf.*, lxxv, no. 2, p. 192, pl. 13, figs. 293-6) gave a full description of the anatomy of three specimens from Saldanha Bay. The radula has a central and a lateral plate resembling those of *Clavatula taxus* and *sinuata*, but Bergh makes no mention of an appendage to the lateral plate. The species seems to be correctly placed in *Clavatula* (*Clionella*), if the identification (or alternatively the locality) is correct. Up to the present there are no other records of this species from the west coast, where the only species seems to be *sinuata* and its var. *sigillata*.

*Clionella confusa* Smith

## Fig. 5c

1906. Smith. *Ann. Natal Mus.*, i, p. 23, pl. 7, fig. 2.  
 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 15 (? part only of colour vars.).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 16 (? pl. 3, no. 130, juv.).  
 1932. id. *ibid.*, p. 16, pl. 3, no. 132 (*kowiensis*), and p. 17 (*k.* var. *viridis*).

Aperture  $1\frac{3}{4}$  to nearly 2 in spire. Protoconch ? Postnatal whorls 8 (9), profile nearly straight. Oblique axial ribs 14-16 on early whorls, 18-20 on



later whorls, on body whorl extending across base to canal. Suture undulate, embracing lower ends of ribs, producing a strong, slightly nodular cingulum. Sulcus deep. Lip sinus narrow, forming the *deepest* part of the concave sulcus.

Growth-lines on cingulum more oblique to the suture than in *sinuata*. Spiral striae (when traceable) numerous but inconspicuous, best seen on early whorls. Up to 40 mm. (apex missing); Smith and Turton give 45 mm.; a specimen (minus protoconch and ? 2 whorls)  $36 \times 10$  mm.

Brown, weathering to orange-red, the cingulum in weathered specimens usually paler, periostracum dark brown; var. *viridis* olive-green with white sutural band.

Port Elizabeth (Smith, Bartsch); Port Alfred (Bartsch, Turton). Port St. Johns, Port Alfred, Jeffreys Bay, Mossel Bay (S. Afr. Mus.).

*Remarks.* Described from a worn specimen. All S. Afr. Mus. specimens are also worn, but some retain portions of the periostracum.

In general, a narrower shell than *sinuata*, with usually a few more ribs, but best distinguished by the lip sinus. Smallest specimen in S. Afr. Mus. 15 mm.

*Clionella rosaria* Rve.

1848. Krauss. *Südafr. Moll.*, p. 109.

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 6.

1906. Smith. *Ann. Natal Mus.*, i, p. 23 (comparison with *confusa*).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 15.

1915. id. *ibid.*, p. 15, pl. 7, fig. 8 (*sybaritica*).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 16, pl. 3, no. 131 (sinistral specimen).

1932. id. *ibid.*, p. 17 (*sybaritica*).

Distinguished conchologically from *confusa* by the slightly narrower (in equal-sized specimens) cingulum, and stronger development of spiral striae. These are numerous (at least a dozen on middle whorls) and in live or fresh specimens probably cross the ribs.

The 'grating' effect (microcancellation) referred to by Bartsch and Turton in *sybaritica* is not a specific character; the strength of growth-lines and striae may vary, but the effect is due to weathering; it may be seen in typical examples of *rosaria*.

Protoconch ? Postnatal whorls 7 (8). Oblique axial ribs 14 on early whorls, on later whorls not exceeding 16 normally; Bartsch mentions an increase from 14 on 6th whorl to 'about 20' on 7th, but ribs are often duplicated, which probably explains the high number 20.

28 ( $6\frac{1}{2}$  whorls present, apex broken)  $\times 10$  mm.

Weathered specimens variously coloured, usually rose or salmon, and flecked with darker red or brown spots, cingulum white with brown marks; rarely unicolorous rose with white cingulum.

Cape (Krauss); Port Alfred (Bartsch, Turton, S. Afr. Mus.).



*Remarks.* Knudsen (1952. *Vid. Medd. Danks. For.*, cxiv, p. 135) states, without reference, that Krauss recorded *rosacea* Rve. [*sic*] from Algoa Bay. In the above reference Krauss recorded *rosaria* from the Cape coast.

*Clavatulula (Clionella) tripartita* Weink.

Fig. 4 d

1877. Smith. *Ann. Mag. Nat. Hist.* (4), xix (*bipartita*).  
 1892. Sowerby. *Mar. Sh. S. Afr.*, p. 6, pl. 4, fig. 83.  
 1902. Smith. *J. Conch.*, x, p. 115, pl. 1, fig. 7 (*parilis*).  
 1903. id. *Proc. Mal. Soc.*, v, p. 362 (*parilis*).  
 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 14 (*bipartita*) and p. 248 (*tripartita*).  
 1915. id. *ibid.*, p. 20, pl. 8, fig. 2 (*helena*) (figs. 2 and 3 transposed).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 15, pl. 3, no. 128 (*bipartita*).

Protoconch  $1\frac{1}{2}$  whorls, alt. and diam. 1 mm., with fine close-set axial pliculae, junction with 1st postnatal whorl abrupt.<sup>14</sup> Postnatal whorls 8 (9). Oblique axial ribs well marked on shoulder of whorls, especially on early whorls. Fine spiral striae on early whorls (if not too worn). Cingulum more (*parilis*) or less (*tripartita*) tumid, a little wider than the smooth sulcus, the latter well defined (*tripartita*) or less defined (*parilis*). Lip sinus deep and narrow. Lirae on base of last whorl sometimes feebly nodulose; in one *parilis* specimen the base is nodulose in axial series, white nodules on orange ground-colour, in other words the axial ribs peter out below the shoulder but reappear as nodules on the lower base.  $46$  (minus protoconch)  $\times$   $16$  mm.

Operculum (in Sowerby's figure) oval, nucleus in middle of inner margin.

Buff, greyish, or dull orange, fine arcuate axial red-brown or orange lines and flames, often more conspicuous on cingulum than on rest of whorl.

Off Durban, 40 fathoms, from fish stomach (Smith: *parilis*); Port Alfred (Bartsch, Turton); Port St. Johns (S. Afr. Mus.). Also several specimens without locality, most of them shiny, none with protoconch (S. Afr. Mus.); 3 typical *parilis* slightly worn, probably *ex pisce* off Durban (S. Afr. Mus.).

Off Umtwalumi, Umkomaas, and Itongazi (Natal), 13-50 fathoms; and Algoa Bay, 10-16 fathoms, all dead. (S. Afr. Mus. P.F. Coll.)

*Remarks.* The series in S. Afr. Mus. leaves no doubt that *parilis* is synonymous. There are plump and slim forms.

The species seems to have its main habitat in the Natal area, where it is obtained from fish stomachs by the trawlers. More or less worn specimens are washed up farther south at Port St. Johns, Port Alfred, and Port Elizabeth.

Turton (p. 16) says he found it alive in the Lagoon at Port Alfred—a rather remarkable statement which needs confirmation.

Dautzenberg (1912. *Ann. Inst. Océan.*, vol. 5, fasc. 3, p. 10) records *tripartita* from south of Senegal, and from Tiger Bay (Angola). This distribution is unexpected, but cf. *Nassa demoulioides*.

<sup>14</sup> Only one specimen, slightly worn, showing traces of axial pliculae. In two other specimens the protoconch is worn quite smooth.

*Clavatula turriplana* Sow.

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 215, pl. 3, fig. 6 (*Pleurotoma* (*Clavatula*) *t.*).

1906. Smith. *Ann. Natal Mus.*, i, p. 24 (listed).

Aperture  $1\frac{1}{2}$  times in spire. Protoconch  $2\frac{1}{2}$  whorls, smooth, but with growth-lines on last half whorl, diam. 1, alt. 1.25 mm., junction with 1st postnatal whorl distinct. Postnatal whorls 10. Oblique axial ribs below sulcus on first 4 or 5(6) whorls, but becoming obsolete on later whorls. Fine spiral striae on all whorls. No cingulum below suture. Lip sinus broad, moderately deep.  $42 \times 11$  mm. (Type); another specimen minus protoconch  $43 \times 12$  mm.

Buff, shoulder of each whorl with a very indistinct pale or white band (Type) or an irregular series of pale patches; protoconch white, glossy.

Off Cape St. Blaize, 85 fathoms (Sowerby). Off Cape St. Francis, 75 fathoms (43 mm. fresh); off Cape Point, 80 fathoms (24 mm., corroded);  $36^{\circ} 40' S.$ ,  $21^{\circ} 26' E.$ , 200 fathoms (24 mm. corroded) (S. Afr. Mus. P.F. Coll.).

Type in S. Afr. Mus.

*Remarks.* The corroded specimen from 200 fathoms has 6 whorls rather angulate at the shoulder, the last (body) whorl smoothly rounded as in the other specimens.

Genus uncertain. The shape of the shell resembles some of the dextral species (e.g. *thalaea* Dall) of *Antiplanes* (west coast of N. America).

*Clavatula* (*Surcula*) *opulenta* Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 226, pl. 36 (24), fig. 15.

Aperture subequal to spire. Protoconch (*apud* Thiele) smooth. Anterior canal long. Shoulder slightly above middle of whorl, slightly angular in early whorls, rounded in later whorls. Oblique axial ribs from shoulder, petering out on base, 15 on early whorls, increasing to 18–20, width subequal to grooves; fine close spiral striae crossing ribs, slightly stronger on base; growth-lines not conspicuous. Lip sinus broad and deep. 39 (protoconch and 2 or 3 whorls missing, only 6 remaining)  $\times 12$  mm.

$35^{\circ} 16' S.$ ,  $22^{\circ} 26' E.$ , 155 metres (Thiele). Off Cape Point, 230 fathoms, 1 broken and corroded; 3 without locality (probably off Cape Point), 18–39 mm., also broken and corroded. (S. Afr. Mus. P.F. Coll.)

*Remarks.* Very like *anteridion*, but with more numerous, sharper, and longer ribs.

*Clavatula* (*Surcula*) *anteridion* Watson

1881. Watson. *J. Linn. Soc. Lond.*, xv, p. 399.

1886. id. '*Challenger*' *Rep.*, xv, p. 295, pl. 19, fig. 6.

1903. Smith. *Proc. Mal. Soc.*, v, p. 363 (listed).

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 223, pl. 37 (25), fig. 3 (*Surcula* sp. juv.).

? not Thiele. *ibid.*, p. 222, pl. 36 (24), fig. 13 (? *anteridion* from New Amsterdam).

Aperture subequal to spire. Anterior canal long. Protoconch 2 ( $2\frac{1}{4}$ ) whorls, diam. and alt. 1.3–1.5 mm., smooth, but with fine growth-lines, junction with 1st postnatal whorl distinct. Postnatal whorls 8–9. Shoulder in middle of whorl, angular in early whorls, rounded in later whorls. Oblique axial ribs from shoulder, petering out on base, 13 on 1st whorl, increasing to 15 on last whorl, subequal in width to the grooves; fine close spiral striae crossing ribs, slightly stronger on base; growth-lines not conspicuous. Lip sinus broad and deep.  $42 \times 11$  (across shoulders of last whorl, 14 if aperture included).

Operculum ovate, nucleus apical,  $6 \times 3.5$  mm. in 36 mm. shell.

Cream or pale buff; protoconch white, glossy; operculum horny.

Off Cape Point, 150 fathoms (Watson);  $35^{\circ} 32' S.$ ,  $18^{\circ} 20' E.$ , 2,750 metres (Thiele).

Off Cape Point, west coast of Cape Peninsula, and Table Bay, 180–230 fathoms. 15 specimens, smallest 15 mm. long, most of them corroded, one with operculum (S. Afr. Mus. P.F. Coll.).

*Remarks.* The identity of these specimens is not in doubt. They are distinguishable at a glance from *opulenta* by the fewer ribs. In this respect they agree with Watson's figure, though he said in his description there were 'about nineteen of these ribs and hollows on the last whorl'; but 19 is the number found in *opulenta*! I prefer to accept his illustration.

Unfortunately the animals in the fresh specimens, even the one retaining its operculum, were completely decomposed, and no radula was obtained.

*Surcula sulcancellata* n. sp.

Fig. 22 c

Aperture subequal to spire. Protoconch  $1\frac{1}{2}$  whorls, smooth. Postnatal whorls 6; profile rounded but with a slight shoulder. Oblique axial ribs 18 on early whorls, 20–21 on later whorls, not quite reaching suture of succeeding whorl, and becoming feeble and obsolescent on body whorl, upper ends projecting above sulcus and somewhat tubercular; spiral lirae 6 on early whorls, becoming more numerous on later whorls, with (especially on body whorl) finer intermediaries. Sulcus concave, with regular retrorse curved axial plicae, 3–5 times as numerous as the ribs, crossed by spiral lirae forming a cancellate sculpture, somewhat more conspicuous on the early whorls. Lip sinus wide but shallow. Canal short.  $31 \times 12$  mm. White.

Off Cape Point, 130–300 fathoms, 5 dead (S. Afr. Mus. A361, A3477, A3481, A3495, P.F. Coll.).

*Remarks.* These five specimens are very similar to *S. obliquicosta* von Martens (1903. *D. Tiefsee Exp.*, vii, p. 80, pl. 2, fig. 1) from off Sumatra, 1,143 metres, but rather broader proportionately to length, and with distinct cancellate sculpture on the sulcus. Von Martens said the retrorse pleats on the sulcus were characteristic of his species, but similar pleats occur in *S. profundorum* Smith 1896.



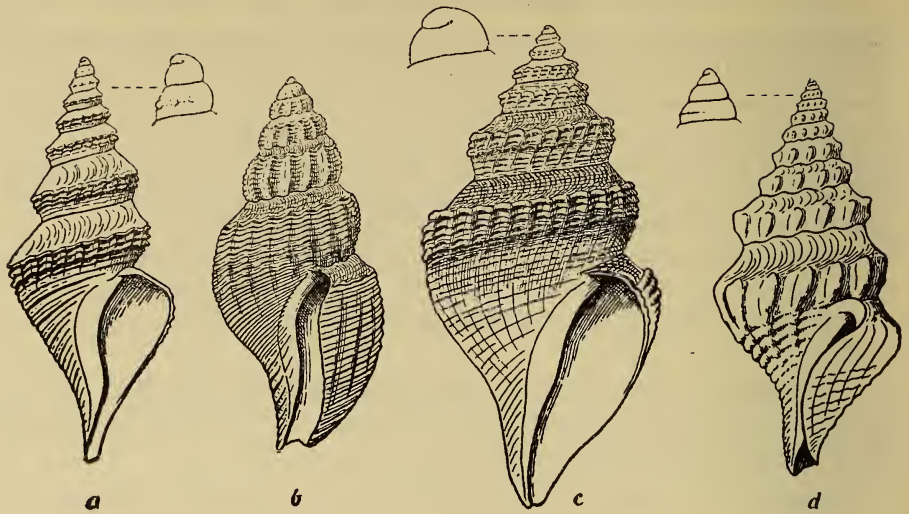


FIG. 22. a. *Surcula amplisulcus* n. sp. b. *S. faurei* n. sp. c. *S. sulcancellata* n. sp. d. *S. scalaria* n. sp.

(and 1898. *Illustr. R.I.M.S. 'Investigator' Moll.*, pl. 7, figs. 2, 2a), from the Maldive Islands, 719 fathoms.

Judging from von Martens's figure these pleats do not seem to be so numerous as in the present species, and they do not extend across the whole sulcus to the tubercle-like ends of the oblique ribs; consequently the sulcus is not cancellate; nor is it cancellate in *profundorum*.

*Surcula scalaria* n. sp.

Fig. 22 d

Aperture a little shorter than spire. Protoconch  $2\frac{1}{2}$  whorls, diam. and alt. c. 0.6 mm., apex very small, diam. 0.25 mm., smooth. Postnatal whorls 8, turreted, with prominent tubercular shoulder. Tubercles 12-13 on early whorls, 11-12 on middle whorls, increasing to 14-15 on body whorl, oval or slightly oblong (axially) strongest at the shoulder, weaker below and just reaching suture of succeeding whorl, indicated on base by slight swellings on the spiral lirae; crossed on early whorls by 2 (in one specimen 3) spiral lirae, which become obsolete on later whorls, but the lower one traceable and making the profile of the tubercles slightly rectangular; spiral lirae well spaced on upper part of base, closer together below, no intermediaries. Suture undulate. Sulcus broad, forming nearly half the whorl, crossed by fine growth-lines only. Lip sinus broad and rather deep. Canal short.  $24 \times 10$  mm. White.

Off Cape Point, 480-800 fathoms, 7 dead (S. Afr. Mus. A358, A360, A1789, A3474, A3476, P.F. Coll.).

*Surcula amplisulcus* n. sp.

Fig. 22 a

Aperture subequal to spire. Protoconch  $1\frac{1}{2}$  whorls, diam. and alt. 1 mm., smooth (but somewhat corroded). Postnatal whorls 7; profile of early whorls prominently shouldered, less prominently on later whorls, and rounded on body whorl. Oblique axial ribs *c.* 18 on middle whorls, not reaching suture below; crossed by well-marked spiral lirae, 2 on 3rd and 4th whorls, increasing to 5-6 on last whorl, *c.* 10 additional lirae on base, without or with only feeble intermediaries. On body whorl the axial ribs indicated only by slight thickenings on the lirae. Sulcus broad, forming half the whorl in early whorls, nearly half in later whorls, crossed by fine growth-lines only. Lip sinus broad and moderately deep. Canal long.  $29 \times 11$  mm. White.

Off Table Bay, 196 fathoms; off west coast of Cape Peninsula, 120 fathoms;  $36^{\circ} 40' S.$ ,  $21^{\circ} 26' E.$  80-100 fathoms. 5 dead (S. Afr. Mus. A1689, A1734, A3337, P.F. Coll.).

*Surcula faurei* n. sp.

Fig. 22 b

Aperture subequal to spire. Protoconch corroded. Postnatal whorls 5, profile rounded, without shoulder. 1st whorl corroded; slightly oblique axial ribs 11 on 2nd whorl, 12 on 3rd, 15 on 4th and 16-17 on 5th (obscure on later half of whorl, but 2 clearly marked at outer lip), reaching suture below, obsolete on base; crossed by spiral lirae 4 on 2nd whorl, 5 on 3rd, 9 on 4th, and 10 plus intermediaries on 5th, *c.* 14 additional fine lirae on base passing into *c.* 10 stronger and more widely spaced ones on rostrum. Suture undulate. Sulcus with numerous distinctly marked growth-lines, crossed by 1, 2 or (on last whorl) 3 fine spiral lirae. Lip sinus deep. Canal short.  $21 \times 9.3$  mm. Pale buff.

Brown's Bank, Agulhas Bank (approx.  $36\frac{1}{2}^{\circ} S.$ ,  $21^{\circ} E.$ ), 80-100 fathoms, 1 dead, but in good condition. (S. Afr. Mus. A8611, P.F. Coll.).

*Pleurotoma (Surcula) dissimilis* Watson

Fig. 23 a

1886. Watson. 'Challenger' Rep., xv, p. 298, pl. 26, fig. 3.

Aperture subequal to spire. Protoconch 2 whorls (lip broken) diam. 1.5 mm., with very fine oblique plicae, passing into the more sigmoid and less conspicuous growth-lines on 1st postnatal whorl, the junction marked by change of colour (brown to white). Postnatal whorls  $6\frac{1}{2}$  (7), profile evenly rounded, scarcely any shoulder. Growth-lines not conspicuous. Very numerous fine spiral striae: below shoulder 3 at beginning of 1st whorl, increasing to 6, 7-8 on 2nd increasing to 12 on 4th and 18-20 on 6th, *c.* 26 on 7th; at least 55 additional striae on base. Growth-lines on sulcus *perpendicular* to the suture, where they form a slight crimping (see Watson's figure), feebly concave across

the sulcus, but strongly protractive from lower border of sulcus. Lip sinus deep. 50 (probably 54 if canal complete)  $\times$  17 mm., 49 (with protoconch)  $\times$  16 mm., two others  $45 \times 14$  mm. Creamy-white, glossy, protoconch pale brown.

Off Cape Point, 660–900 fathoms, green mud. 5 dead, but in good condition. (S. Afr. Mus. P.F. Coll.)

*Distribution.* SE. of the Philippine Islands, 500 fathoms (Watson).

*Remarks.* There is a close resemblance between this species and *S. alberti* Dautzenberg & Fischer (1906. *Res. Sci. Camp. Monaco*, fasc. 32, p. 16, pl. 1, figs. 8–10) from off Cape Verde, 3,890 metres.

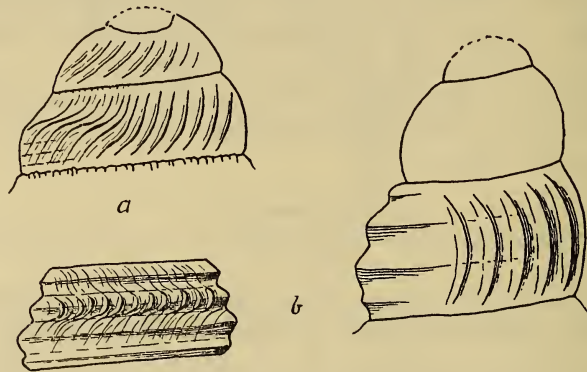


FIG. 23. a. *Surcula dissimilis* Watson, protoconch. b. *Turris ambages* n. sp., one whorl and protoconch.

Comparison of the figures shows that the lower part of the columella is a little more curved and the aperture broader in *alberti* than in *dissimilis*. The Cape specimens agree better with the latter.

For this reason it seems better to identify the Cape specimens with *dissimilis*, although evidence of a faunistic relationship, dating perhaps from Miocene times, between the north and south Atlantic off the west coast of Africa is accumulating. (See: *Cancellaria (Sveltia) lyrata*.)

The course of the growth-lines is not shown very clearly in the figures of either *dissimilis* or *alberti*, certainly not the almost horizontal direction at the lower boundary of the sulcus which is so conspicuous in the present specimens.

The animal of *alberti* was reported to be closely related to that of the genus *Bela* (not *Bela* of Thiele 1929), but no figure of its radula was given. Presumably it had no operculum.

*Turris ambages* n. sp.

Fig. 23 b

Protoconch 3 whorls, diam. 1.25–1.3, alt. 1.3–1.5 mm., with axial riblets (as in *Turris*). Postnatal whorls with 4 strong spiral keels (profile of whorl



4-lobate), 1st rather sharp, forming the cingulum, 2nd rounded forming the lip sinus, with growth-lines producing more or less conspicuous squamiform nodules, 3rd the most prominent, rounded, forming the periphery, below this the smaller 4th keel; base with ? *c.* 10 additional lirae.  $17 \times 7$  mm. (protoconch and 7 whorls);  $25 \times 8$  (protoconch and 8 whorls); a broken specimen 30 mm. long, with 5 whorls corresponding to the 5th–8th whorls plus a portion of the 9th whorl.

The 17 mm. example is whitish, with traces of irregular brown spots and streaks.

Off Cape Natal (Durban), 54 fathoms, 2 broken specimens; off Umkomaas River, 40 fathoms, 1 (17 mm. long); off O'Neil Peak (Zululand), 90 fathoms, 1 (25 mm. long) (S. Afr. Mus. A8683–A8685, P.F. Coll.).

*Remarks.* Adams & Reeves' figure of *fagina* (1850. *Voy. 'Samarang' Moll.*, pl. 9, figs. 2 *a, b*) shows 4 keels, but the 2nd separated from the 1st by a wide groove, and at least as wide and prominent as the 3rd. The accuracy of the drawing is confirmed by Yen's figure (1942. *Proc. Malac. Soc.*, xxiv, pl. 25, fig. 184). The position of the lip sinus is not absolutely clear in either figure.

Moreover *fagina* is a large species (78 mm. in Yen's figure if nat. size), and presumably has a larger protoconch (? 2 mm. diam. in Yen's figure) than the present specimen.

According to Melvill (1917. loc. cit., p. 147) *Pleurotoma annulata* Rve. (*Conch. Icon.*, i, pl. 5, fig. 55) is near akin to *fagina*.

*Acrobela acus* n. sp.

Fig. 21 *e*

Protoconch  $4\frac{1}{2}$  whorls, first 2 smooth, the following with criss-cross sculpture, alt. 0.7, diam. 0.4 mm. Postnatal whorls  $3\frac{1}{2}$ ; 1st whorl with one peripheral keel at start, but soon with one above and one below, following whorls with 3 keels, the median one peripheral and strongest; no distinct axial sculpture except the protractive curved growth-lines in the sulcus; additional lirae on base 4 or 5 rather strong and 8–9 finer ones.  $4.75 \times 2$  mm.

Off Cape Recife, 256 fathoms, 2 and one fragment, dead (type material); off Cape St. Blaize, 125 fathoms, one dead (S. Afr. Mus. A8748 and A8562, P.F. Coll.).

*Remarks.* Nearest to *A. sansibarica* Thiele (1925. *D. Tiefsee Exp.*, xvii, p. 239, pl. 37 (25), fig. 21), but the latter has a cingulum below the suture and only one spiral keel.

*A. circumvertens* (M. & S.), with which *A. optima* Thiele 1925 appears to be synonymous, from Gulf of Oman and East African coast, also has a cingulum and, in the later whorls, 2 spiral keels.

*Taranis miranda* Thiele (1925. loc. cit., p. 254, pl. 32 (20), fig. 7), from  $34^{\circ} 51' S.$ ,  $19^{\circ} 37' E.$ , 80 metres, has a low protoconch ( $1\frac{1}{2}$  whorls), 2–3 rather

broad keels which are crossed (in the figure) by pliculae, retractive across the sulcus.

Distinguished from 'Bela' *eva* (*supra*, p. 114) by the three spiral keels, the absence of axial pliculae (except in the sulcus), the growth-lines in the sulcus being protractive, and by the very different protoconch.

*Cythara alfredi* (Smith)

Fig. 25 a

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 7 (*Mangilia costata*, non Donovan).  
 1897. id. *Append. Mar. Sh. S. Afr.*, p. 31 (*costata* var. *coarctata*, non Forbes).  
 1904. Smith. *J. Malac.*, xi, p. 29, pl. 2, fig. 9.  
 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 31 (*alfredensis* typ. err.).  
 1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 229, pl. 37 (25), fig. 22 (*Haedropleura dora*).  
 1925. id. *ibid.*, p. 232, pl. 40 (28), fig. 1 (*Mangelia misera*).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 29, pl. 6, no. 218.  
 1932. id. *ibid.*, p. 30, pl. 6, no. 219 (*thetis*) (not *Drillia thetis* Smith).

Protoconch  $2\frac{1}{2}$  whorls, with faint axial pliculae towards junction with 1st postnatal whorl. Postnatal whorls usually 4, sometimes 5. Axial ribs 6 (7) on 1st whorl, 7 (sometimes 8) on following whorls; spiral lirae *c.* 8 on 1st whorl increasing to *c.* 25-30 on last whorl, about the same number of additional lirae on base.  $7.8 \times 2.75$  mm.

Fulvous, 4th whorl usually paler with a fulvous band in middle.

Recorded (dead) from Kalk Bay (False Bay) to Port Alfred. S. Afr. Mus. has one specimen alleged to come from Table Bay, but the provenance is doubtful.

Thiele's *H. dora* from Algoa Bay, depth not stated; and *M. misera* from  $35^{\circ} 16' S.$ ,  $22^{\circ} 26' E.$ , 155 metres.

Off Illovo River (Natal), 27-30 fathoms; off Cove Rock (East London area), 22 fathoms; Algoa Bay, 67 fathoms; off Cape Recife, 124 fathoms; off Cape St. Blaize, 37 fathoms; all dead (S. Afr. Mus. P.F. Coll.).

*Cythara ima* Bartsch

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 31, pl. 3, fig. 1.  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 30.

Protoconch 2 whorls, smooth. Postnatal whorls 5. Axial ribs 10 on 1st-3rd whorls, 12 on 4th and 5th; spiral lirae *c.* 24 on last whorl, plus *c.* 30 on base.  $8.1 \times 3.5$  mm. (Bartsch).

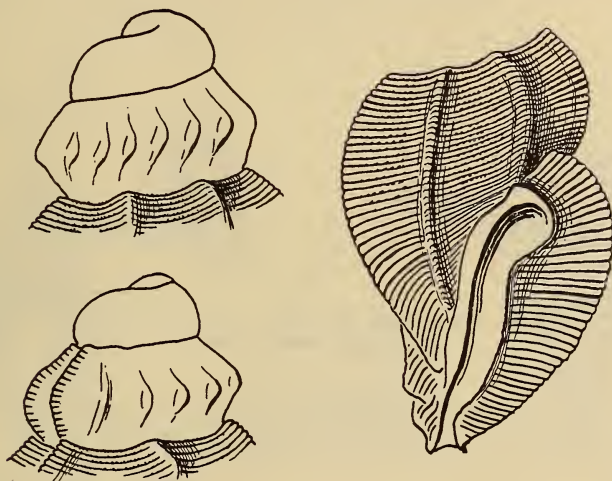
Recorded from Simon's Bay and Port Alfred.

S. Afr. Mus. has 2 worn specimens from Port Alfred, identified and presented by Turton. The larger measures 9 (apex worn, 5 whorls)  $\times$  3.75 mm. Neither specimen corresponds with Bartsch's description; they appear to be merely 8-ribbed examples of *alfredi*.

*Cythara deliciosa* n. sp.

Fig. 24

Protoconch  $2\frac{1}{2}$  whorls, alt. 0.6, diam. 0.75 mm., smooth at start, last half or three-quarters with a series of peripheral axially oblique knobs, and an axial plica about at the junction (which is obscure) with 1st postnatal whorl. Postnatal whorls  $3\frac{1}{2}$ , with 7 sharp axial ribs on each whorl, and numerous fine spiral lirae, c. 20 on 1st whorl and 25 on body whorl (excluding base), last rib with at least 40 lirae; lirae with very minute prickles on both sides, so that the intervening striae appear punctate.  $5.3 \times 2.3$  mm. Uniform pale brown.

FIG. 24. *Cythara deliciosa* n. sp., body whorl and protoconch.

Off Umhloti River (Natal), 40 fathoms. 6 dead but unworn specimens (S. Afr. Mus. A8692, P.F. Coll.).

*Remarks.* Distinguished from *alfredi* by the lower, more squat protoconch, with nodules, the more numerous spiral lirae on the postnatal whorls, and the sharper axial ribs.

*Mangilia amplexa* Gould

Fig. 25 b

1860. Gould. *Proc. Boston Soc. N.H.*, vii, p. 338.  
 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 30, pl. 2, fig. 10, pl. 7, fig. 6.  
 1915. id. *ibid.*, p. 30, pl. 2, fig. 6 (*humerosa*).  
 1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 229, pl. 37 (25), fig. 23 (*Haedropleura thea*).  
 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 27, pl. 6, no. 205 (*rietensis*).  
 1932. id. *ibid.*, p. 29.



Protoconch  $2\frac{1}{2}$  whorls, smooth. Postnatal whorls  $4\frac{1}{2}$ –5. Axial ribs 10 on 1st whorl, 10–11 on 2nd and 3rd, 11–13(14) on 4th; spiral lirae 6–7 on 1st whorl, increasing to 18–20 on last whorl, 18–20 additional lirae on base.  $9.5 \times 3.5$  mm.

Simon's Bay (Gould), Port Elizabeth (Sowerby), Port Alfred (Bartsch, Turton).

Algoa Bay (Thiele).

Table Bay, Kalk Bay and Gordon's Bay (False Bay), Still Bay (S. Afr. Mus.).

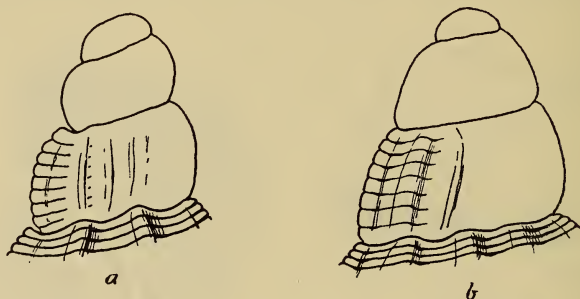


FIG. 25. Protoconchs of: a. *Cythara alfredi* (Smith), and b. *Mangilia amplexa* Gould.

Algoa Bay, 67 fathoms; off Keiskamma Point, 33 fathoms; and off East London, 27–32 fathoms; all dead (S. Afr. Mus. P.F. Coll.).

*Remarks.* The numbers '14' and '12' (axial ribs) in Bartsch's description of *amplexa* seem to be transposed; in any case the numbers are too high (see his figures).

#### *Mangilia eucosmia* Bartsch

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 28, pl. 2, fig. 7.

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 27.

1932. id. *ibid.*, p. 28, pl. 6, no. 212 (*rufanensis*).

Protoconch and coloration as in *amplexa*. Distinguished by the more convex (shouldered) whorls and deeper sutures, fewer and more oblique axial ribs. Nevertheless the two 'species' are doubtfully distinct. On two occasions both were found together in the same bottom sample.

According to topotype examples received from Turton, the numbers of ribs stated by Bartsch are much too high: the present topotypes have only 10–11 on the last whorl, which is fewer than in *amplexa*. In face view only 3 ribs appear between those forming the profile on either side, whereas in *amplexa* 4 are visible. In this respect Bartsch's figure corresponds neither with the topotypes nor with the *Pieter Faure* specimens.

Port Alfred (Bartsch, Turton). Common in the lagoon (estuary) at Port Alfred (Turton).

Off East London, 32 fathoms; off Keiskamma Point, 33 fathoms. (S. Afr. Mus. P.F. Coll.)

*Mangilia muiri* n. sp.

Fig. 26 a

Protoconch 3 whorls, smooth (but probably worn), an obscure spiral keel at end of 3rd whorl. First postnatal whorl with 2 feeble spiral keels which develop into spiral lirae with knobs at intersections with the 13-14 axial ribs; the latter starting from suture, where they are slightly enlarged.

Still Bay (S. Afr. Mus. A8647, Muir Coll.).

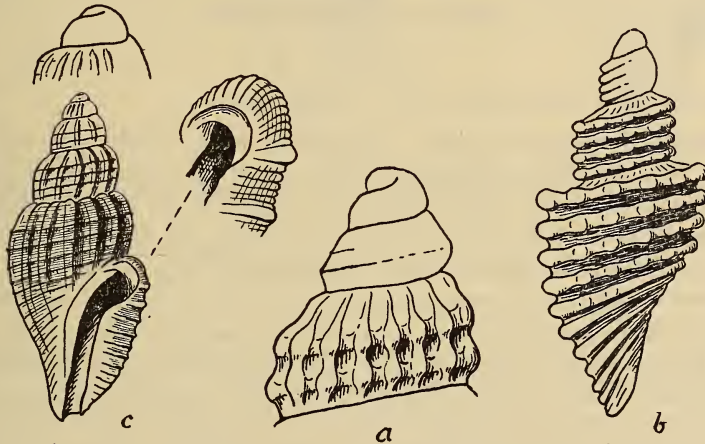


FIG. 26. a. Apex of *Mangilia muiri* n. sp. b. *M. kowiensis* Turton. c. *M. shepstonensis* Smith, with protoconch and lip sinus further enlarged.

*Remarks.* There are 8 specimens from 1 mm. long (protoconch and 1st whorl) to  $2.75 \times 1.5$  mm. (protoconch and 2 whorls).

*Mangilia benjamini* Bartsch

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 26, pl. 7, fig. 5.

False Bay (Bartsch; collected by the U.S. Exploring Exp., 1853).

*Remarks.* This species, based on ? only one specimen, is broader than *Surcula macilentata* Melv., the width less than 3 in the length (1 : 2.7), but otherwise there is considerable resemblance (see *Drillia platystoma*, p. 125). It was described as having 9 postnuclear whorls at a length of 15.3 mm.

Thiele described two species from the Agulhas Bank also very similar to *benjamini*, having the whole whorl covered with fine spiral lirae: *Pleurotoma?* *vilma* (1925. *D. Tiefsee Exp.*, xvii, p. 229, pl. 37 (25), fig. 1) and *Crassispira?* *agulhasensis* (ibid., p. 213, pl. 35 (23), fig. 11). In both of these, however, the axial ribs cross the sulcus to the suture above.

*Mangilia kowiensis* Turton

Fig. 26 b

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 25, pl. 5, no. 190.

Protoconch  $1\frac{1}{2}$  whorls, smooth. Postnatal whorls 3, each with 4 strong spiral lirae separated by deep grooves. Shoulder strongly tabulate. Axial ribs not conspicuous, but indicated by 10 or 11 nodules on the lirae on 2nd and 3rd whorls; when viewed apically the periphery is undulate. 7-8 additional lirae on base, decreasing in size anteriorly.  $3.3 \times 1.5$  mm.

Port Alfred (Turton).

34° S., 25° 45' E., depth not recorded, 1 dead (S. Afr. Mus. P.F. Coll.).

*Mangilia shepstonensis* Smith

Fig. 26 c

1914. Smith. *Ann. Natal Mus.*, iii, p. 1, pl. 1, fig. 1.

Aperture subequal to spire. Protoconch  $2\frac{1}{2}$ -3 whorls, alt. 0.3, diam. 0.5 mm., smooth, glossy. Postnatal whorls 4, profile convex with rounded, almost tabulate shoulder. Axial ribs 18 close together on 1st (or last half whorl of protoconch plus 1st postnatal whorl), 12 on 2nd, 3rd and 4th, not quite as wide as intervals, crossing sulcus and extending half-way across base; crossed by 4 narrow spiral lirae on each whorl, the 4th lira low down near suture, and also by extremely fine spiral striae, *c.* 10-12 of the latter in sulcus on last whorl, and *c.* 5 between each pair of lirae; *c.* 14 additional lirae on base, with intervening striae. Sulcus concave between the ribs. Lip sinus deep, adjoining suture.  $5 \times 2$  (4 whorls) and  $4.5 \times 1.75$  mm. (3 whorls); Smith:  $4.3 \times 2$  mm.

Pale buff, a faint brown mark in middle of the incrassate outer lip. Yellowish, with a narrow rufous interrupted band around middle of last whorl (Smith).

Port Shepstone (Natal) (Smith).

Off Umhloti River (Natal), 40 fathoms, one fresh, one slightly worn; off Umkomaas River (Natal), 40 fathoms, one worn; off Cove Rock (East London area), 22 fathoms, 2 unworn (S. Afr. Mus. P.F. Coll.).

*Remarks.* The narrow spiral lirae are continuous across, but subordinate to, the axial ribs. In addition to the semicancellate macro-sculpture, the growth-lines and the spiral striae produce a very fine micro-cancellate sculpture in each hollow.

The junction of protoconch and 1st postnatal whorl is indistinct; probably 5 or 6 of the more closely set initial axial ribs belong to the last half whorl of the protoconch.

There seems to be no great difference between this species and *Glyphostoma siren* Smith 1904. The latter has only 10 ribs, which are not '*superne rotunde tabulati*'; and Smith makes no mention of the presence of any microsculpture.

Contrast also *Drillia tholos* (*supra*).



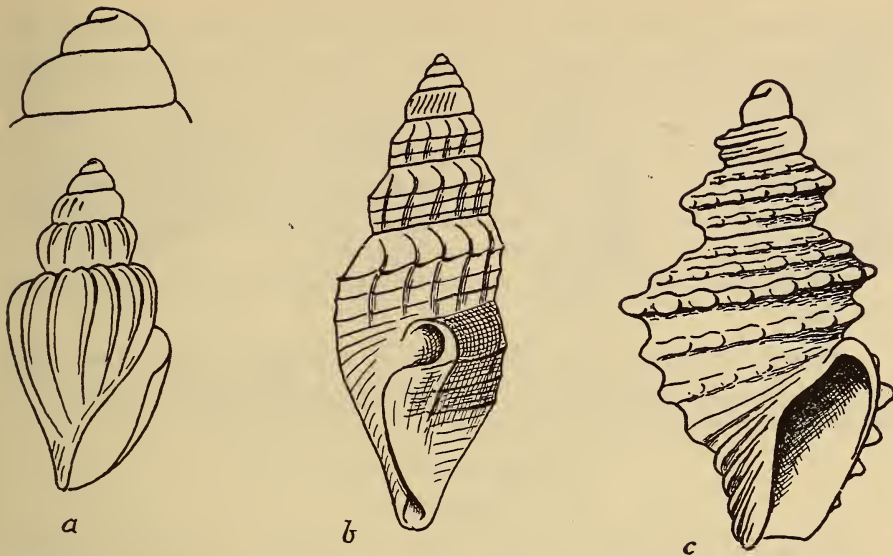


FIG. 27. a. *Mangilia translucens* n. sp., and protoconch. b. *M. phoxos* n. sp. c. *M. exstans* n. sp.

*Mangilia translucens* n. sp.

Fig. 27 a

Aperture a little longer than spire. Protoconch 3 whorls, alt. 0.5 diam., 0.75 mm., smooth, glossy. Postnatal whorls 3, profile convex with distinct but rounded shoulder. Axial ribs 12–13 on each whorl, narrow, sharp when fresh, extending across sulcus and across base; no spiral sculpture except a mere trace here and there of one or two striae. 5 × 2.3 mm. Pale buff, semitranslucent, glossy.

Off Tugela River, 65–80 fathoms, one glossy; off Umhloti River (Natal), 40 fathoms, 12 specimens, some glossy, some dull, some broken (type material); off Umkomaas River (Natal), 40 fathoms, one dull; off East London, 32 fathoms, 1 glossy, 3 dull; all dead (S. Afr. Mus. A8755, A8586, A8726, A8732, P.F. Coll.).

*Remarks.* The ribs where they cross the sulcus and form the shoulder are usually more prominent than shown in the figure.

*Mangilia phoxos* n. sp.

Fig. 27 b

Aperture  $1\frac{1}{4}$  in spire. Protoconch 4 whorls, alt. and diam. 0.75 mm., first 3 whorls smooth, fine close-set axial pliculae on last three-quarters of 4th whorl, glossy. Postnatal whorls 3, profile convex with slight shoulder. Axial ribs 11 on 1st, 12 on 2nd and 3rd whorls, fine but distinct, curved on sulcus and slightly oblique below shoulder, petering out on base; crossed by

slight and narrow spiral lirae 2 on 1st, 3 on 2nd and 3rd whorls, the upper one defining the sulcus and forming the shoulder, forming slight complanate nodules at intersections, *c.* 18 additional lirae on base; in addition extremely fine spiral lirae over whole whorl, 6 in sulcus on 1st whorl increasing to 10 on 3rd, 4 between each of the two pairs of main lirae, and forming intermediaries between the lirae on base; these fine lirae together with the fine growth-lines form a microgranulate or microcancellate sculpture. Lip sinus deep, adjoining suture.  $5.8 \times 2$  mm. Pale buff, protoconch glossy.

Off Umhloti River (Natal), 40 fathoms, one dead (S. Afr. Mus. A8730, P.F. Coll.).

*Remarks.* Similar to *M. (Paraclathurella) padangensis* Thiele 1925 from Sumatra, but with finer spiral lirae and no regularly granulate whorl near apex (on last part of protoconch: Thiele).

*Mangilia exstans* n. sp.

Fig. 27 *c*

Protoconch  $1\frac{1}{2}$  whorls, smooth. Postnatal whorls 3, each with 2 spiral lirae, the upper being the more prominent, especially on 3rd whorl; in sulcus one additional lira on 1st whorl, 2 lirae on 2nd and 3rd; no axial ribs, but lirae with complanate nodules: 12 on the peripheral lira on 2nd whorl, 14 on 3rd, the lower lira and those in sulcus also nodulose; 7 additional lirae on base, rather strong and well spaced, more or less feebly nodulose.  $2.5 \times 1.3$  mm. (1.5 including lirae).

Off Cove Rock (East London area), 22 fathoms, one dead (S. Afr. Mus. A8756, P.F. Coll.).

*Remarks.* Distinguished by the prominent peripheral lira and absence of axial ribs. Protoconch not so elevated as in *tranquilla* (*infra*).

*Mangilia nisga* Bartsch

Fig. 28 *d*

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 25, pl. 7, fig. 1.

Protoconch  $1\frac{1}{2}$  whorls, smooth. Postnatal whorls 3, each with 3 spiral lirae. Axial ribs beginning on later half of 1st whorl, 10 on 2nd, 11 on 3rd, forming rounded knobs at intersections with the lirae. 7-8 additional lirae on base, feebly nodulose. An additional lira with feeble knobs in the sulcus on 2nd and 3rd whorls.  $3.5 \times 1.75$  mm.

Port Alfred (Bartsch, Turton).

$34^{\circ} 26' S.$ ,  $25^{\circ} 42' E.$ , 124 fathoms, and  $33^{\circ} 3' S.$ ,  $27^{\circ} 57' E.$ , 32 fathoms. 3 dead (S. Afr. Mus. P.F. Coll.).

*Remarks.* Bartsch said there were 14 ribs on the last whorl, which seems scarcely compatible with his figure. The 4th spiral lira shown in Bartsch's figure as *above* the posterior end of the aperture, is in these specimens on a level with or below it, and definitely on the base.

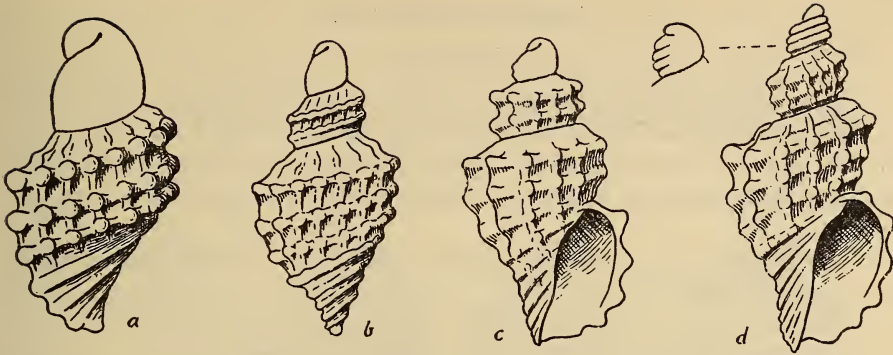


FIG. 28. a. *Mangilia minuscula* Smith (nodulose form), protoconch. b. *M. tranquilla* n. sp. c. *M. sciola* n. sp. d. *M. nisga* Bartsch, with protoconch further enlarged.

*Mangilia sciola* n. sp.

Fig. 28 c

Protoconch  $1\frac{1}{2}$  whorls, smooth, junction between protoconch and 1st whorl obscure. Postnatal whorls 2, each with 2 spiral lirae. Axial ribs beginning a little later than the spiral lirae, 11 on 1st, 12 on 2nd whorl, forming rounded knobs at intersections with lirae. 6 additional lirae on base, the 3 posterior ones nodulose. No lira in sulcus.  $3 \times 1.5$  mm.

$34^{\circ} 27' S.$ ,  $25^{\circ} 42' E.$ , 256 fathoms, and  $33^{\circ} 6' S.$ ,  $27^{\circ} 55' E.$ , 43 fathoms. 2 dead (S. Afr. Mus. A8642, A8643, P.F. Coll.).

*Remarks.* Deceptively like *nisga*, but with only 2 spiral lirae. The specimen from shallower water is fresh, but that from deep water is somewhat worn.

*Mangilia ponsonbyi* (Sow.)

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 7, pl. 1, fig. 5 (not good) (*Defrancia* p.).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 31.

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 230 (*Clathurella* p.).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 25.

Sowerby gives 10 axial ribs on last whorl on shell  $6.5 \times 3$  mm. with 6 (total) whorls, and 4 spiral lirae.

Three worn specimens in S. Afr. Mus. (coll. Turton), largest with 5 whorls (minus protoconch)  $8.5 \times 3.5$  mm., have 13 ribs on 3rd, 4th and 5th whorls, crossing sulcus, and continued across base; and 6 spiral lirae (2 fine ones on sulcus, 4 stronger ones between shoulder and suture below) on 4th and 5th whorls, slightly nodulose at intersections with ribs; 8 (9) additional lirae on base. Columella with 2-3 pleats and inner margin of outer lip 6-7 plicae.

Turton gave the size as  $10 \times 3$  mm.

Recorded (dead) from Port Elizabeth and Algoa Bay, and Port Alfred.



*Mangilia tranquilla* n. sp.

Fig. 28 b

Protoconch  $1\frac{1}{2}$  whorls, elevated, smooth. Postnatal whorls 2. Spiral lirae 2, slightly nodulose at intersections with axial plicae, of which there are 13-14 on 1st, and 15-16 on 2nd whorl; plicae traceable across sulcus, with slight nodular enlargements on 2nd whorl; lattice hollows between 1st and 2nd lirae square.

Protoconch plus 1st whorl  $1.3 \times 0.75$  mm.; protoconch plus 2 whorls  $2 \times 1.5$  mm. White.

Still Bay, 2 specimens (S. Afr. Mus. A8648, Muir Coll.).

Cf. *Mangilia gemmula* Turton 1932, which has 12 axial plicae.

The protoconch is smaller and proportionately narrower than in *Tritonalia scrobiculata*.

*Mangilia minuscula* Smith

Fig. 28 a

1910. Smith. *Ann. Natal Mus.*, ii, p. 191, pl. 7, fig. 4.

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 24, pl. 7, fig. 3 (*Mangilia gisna*).

Protoconch  $1\frac{1}{2}$  whorls, elevated, smooth. Postnatal whorls 3. Two spiral lirae at beginning of 1st whorl, on later half a third lira develops between shoulder and suture below, on 2nd and 3rd whorls 3 lirae. Axial ribs subordinate to the lirae but forming conspicuous knobs at intersections, and connecting riblets between the lirae, 12 on 1st whorl, 16 on 2nd and c. 20 on 3rd (Bartsch's '28' is too high a number for the present specimens, and conflicts with his figure; ? type err. for 20); 7-8 additional lirae on base. Protoconch alt. 0.5, diam. 0.35 mm.; protoconch plus half 1st whorl  $1 \times 0.5$  mm.;  $3 \times 1.3$  mm.

Recorded from Port Elizabeth and Port Alfred. Kalk Bay (False Bay) and Still Bay (S. Afr. Mus.). False Bay (U.C.T.).

*Remarks.* Specimens from the Muir collection from protoconch up to 3-whorled examples.

Turton says *minuscula* and *gisna* are easily distinguished, but specimens of both identified by him are indistinguishable; *gisna* is the strongly nodulose form.

Similar to *verrucosa* Sow., but narrower and with more numerous axial ribs (knobs): 12-20 instead of 11-14.

*M. helga* Bartsch differs in having the spire distinctly longer than aperture, 4 spiral lirae on last half of 1st whorl, and on 2nd and 3rd whorls, and no axial plicae or knobs on the lirae.

*Philbertia natalensis* n. sp.

Fig. 29 a

Protoconch  $3\frac{1}{2}$ -4 whorls, diam. and alt. 0.5 mm., with criss-cross sculpture. Postnatal whorls 3, profile angular slightly below middle. Axial riblets 9 on each whorl, rounded, narrower than intervals, extending above almost to

suture, obsolete on base; crossed by spiral lirae, 3 on 1st whorl, the lowest the strongest and peripheral, 4 on 2nd, 2 above and one below the peripheral lira, on body whorl 4-5 above and 3-4 below, *c.* 12 additional lirae on base. Sulcus not concave, a very feeble cingulum below suture. Lip sinus adjoining suture.  $5 \times 2.3$  mm.

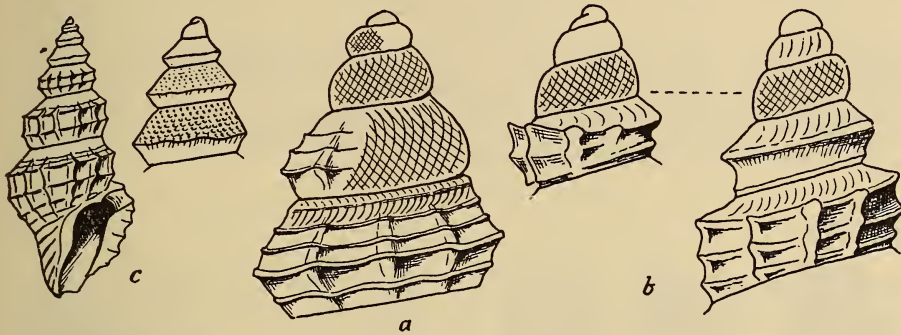


FIG. 29. a. *Philbertia natalensis* n. sp., protoconch. b. *P. capensis* (Smith), two views of protoconch. c. *P. alfredensis* (Turton), with protoconch.

Off Umhloti River mouth, Natal, 40 fathoms, 1 dead; off Cape Natal (Durban), 54 fathoms, 1 dead; (S. Afr. Mus. A8654, A8758, P.F. Coll.).

*Remarks.* Protoconch broader than in *P. capensis* (p. 117), 1st postnatal whorl not abruptly wider than protoconch, and sculpture less outstandingly cancellate.

*Philbertia alfredensis* (Turton)

Fig. 29 c

? 1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 240, pl. 38 (26), figs. 4, 4a (*Bellardiella sultana*).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 24, pl. 5, no. 181 (*Bellardiella alfredensis*).

Aperture  $1\frac{1}{2}$  in spire. Protoconch 4 whorls, alt. 0.75, diam. 0.5 mm., 2nd to 4th whorls in profile angular slightly below middle, but not sharply keeled, minutely and closely punctate in spiral lines (and also in axial series). Postnatal whorls 3. Axial ribs 10 on 1st and 2nd whorls, 11 on 3rd whorl, feebly indicated across sulcus, obsolete on lower half of base, narrower than intervals; spiral lirae narrower than ribs, 2 on each whorl, intersections slightly nodulose, 7 additional lirae on base; in the sulcus one fine lira on 2nd whorl, 2 on 3rd whorl. Lip sinus deep, adjoining suture.  $3.75 \times 1.5$  mm.

Off Tugela River (Natal-Zululand), 65-80 fathoms, one dead (S. Afr. Mus. A8761, P.F. Coll.).

*Remarks.* Seems to be referable to Turton's species, based on a very worn specimen,  $4 \times 1.8$  mm., from Port Alfred. Turton compared his species with *Bellardiella* sp. Thiele 1925 (loc. cit., pl. 38 (26), fig. 7) from East Africa.

Thiele described *B. sultana* and other species from the same area. I should be inclined to refer the P.F. specimen to *sultana* ( $7 \times 2.75$  mm.), but for the presence of the fine lirae in the sulcus, which Thiele neither mentions nor figures.

*Daphnella sulcata* (Sow.)

Fig. 30 b

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 11, pl. 1, fig. 10 (*Cominella* ? s.).

1904. Smith. *J. Malac.*, xi, p. 28 (*Daphnella* ? s.).

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 32 (*Daphnella* ? s.).

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 30.

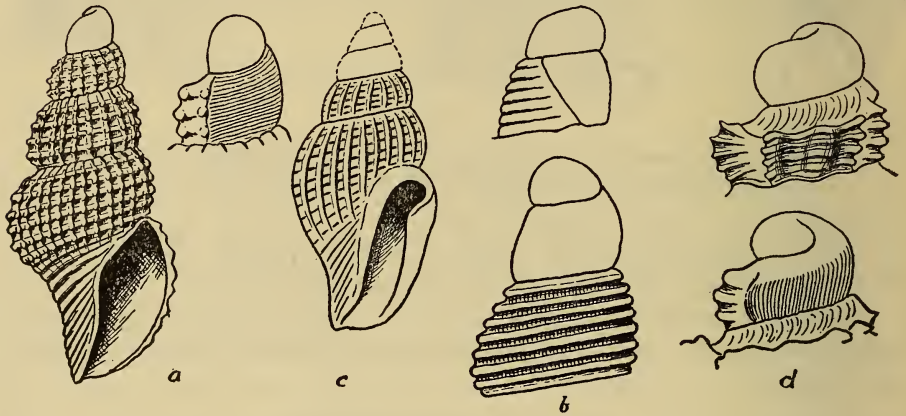


FIG. 30. a. *Daphnella recifensis* n. sp., with protoconch. b. *D. sulcata* (Sow.), two views of protoconch. c. Worn specimen referred to *Thesbia algoensis* Thiele. d. *Pleurotomella ursula* Thiele, two views of protoconch of 9 mm. specimen.

Protoconch  $1\frac{1}{2}$  whorls, smooth, junction with 1st whorl oblique. Postnatal whorls 4 (shell 9 mm., Sowerby: total whorls 6, shell 10 mm.). Spiral lirae (5)6-7 on 1st whorl, 6-8 on 2nd and 3rd, 7-8 on 4th, width subequal to the grooves which are crossed by fine growth-lines; 8-9 additional lirae on base; 3-5 denticles on inner side of outer lip.  $7.3 \times 2.5$  mm., Sowerby:  $10 \times 3$ .

Pale fulvous, obscurely mottled or uniform (Sowerby); yellow, spotted with brown, or uniform yellowish-brown (Turton).

Recorded (dead) from Port Elizabeth and Port Alfred. Still Bay, dead (S. Afr. Mus. Muir Coll.). Off Cape St. Blaize, 125 fathoms, one broken; off Cove Rock (East London area), 22 fathoms, one dead; off Umkomaas River (Natal), 40 fathoms, one and three fragments; off Cape Vidal (Zululand), 80-100 fathoms, one broken (S. Afr. Mus. P.F. Coll.).

*Remarks.* Sometimes the spiral lirae have slight thickenings—'subgranose' (Smith)—making their margins feebly undulate.



Three worn specimens (S. Afr. Mus. loc.?), however, show a definite cancellate sculpture, due to well-marked axial plicae, slightly nodulose at intersections with the lirae; the latter are fewer in number: 5 on 1st whorl, 6 on the others. Two of these specimens have a series of brown spots around the middle as in some typical specimens.

Of the Natal specimens, two of the fragments are normal, with growth-lines in the grooves, some of the growth-lines stronger than others; the third fragment and the complete specimen are definitely cancellate, the axial ribs as strong as the spiral lirae. This complete specimen, which has the characteristic obliquely and abruptly ending protoconch, would certainly be regarded as a separate species but for the connecting 'subgranose' specimens.

*Daphnella recifensis* n. sp.

Fig. 30 a

Protoconch  $1\frac{1}{2}$  whorls, moderately elevated, very finely spirally striate, junction with 1st postnatal whorl distinct. Postnatal whorls 3. Axial ribs 16 on 1st, 20 on 2nd, 27 on 3rd whorl, from suture to suture, petering out on base; spiral lirae 3 on 1st, 4-5 on 2nd, 6 on 3rd whorl, 10 additional on base; ribs predominant over the lirae, nodulose at intersections.  $4.5 \times 1.75$  mm. White.

Off Cape Recife ( $34^{\circ} 27' S.$ ,  $25^{\circ} 42' E.$ ), 256 fathoms, one dead (S. Afr. Mus. A8757, P.F. Coll.).

*Remarks.* A much smaller species than *alfredensis* Bartsch. Smaller and broader than *Daphnellopsis lamellosa* Schepman 1913 and *Daphnella subuloides* Schepman 1913, to which there is some similarity in sculpture.

*Daphnella alfredensis* Bartsch

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 32, pl. 8, fig. 3.

In an 8 mm. topotype (top of protoconch worn) with 3 postnatal whorls, there are *c.* 12, 16 and 21 axial riblets on 1st, 2nd and 3rd whorls respectively, i.e. more than Bartsch gave in his description (his figure shows too few!); spiral lirae 3 on 1st whorl, 6 on 2nd, 16-17 on 3rd, including those on sulcus (Bartsch said 'appressed portion' appears to be free of spiral sculpture).

*Thesbia algoensis* Thiele

Fig. 30 c

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 232, pl. 40 (28), fig. 14.

Aperture subequal to spire. Protoconch  $1\frac{1}{2}$  whorls, somewhat lopsided (corroded). Postnatal whorls 3, profile evenly convex. Axial ribs (1st whorl corroded), *c.* 19 on 2nd whorl, 21 on 3rd, not strongly curved, crossing sulcus which is not defined, subequal in width to intervals; spiral lirae 5-6 on 2nd whorl, 6-7 on 3rd, showing only in the intervals between ribs, *c.* 12 additional lirae on base.  $4.5 \times 2.25$  mm. Thiele:  $3.5 \times 1.7$  mm. Buff.

Algoa Bay (33° 50' S., 25° 48' E.), depth not stated (Thiele). Off Cape Morgan, 47 fathoms, one abraded specimen (S. Afr. Mus. A8734, P.F. Coll.).

*Remarks.* Thiele did not state the number of ribs and lirae; his figure seems to show a few more than in the present specimen, but the slight discrepancy does not preclude referring the *Pieter Faure* specimen to his species.

Although Thiele's figures of *T. algoensis* and *Columbella diana*e appear different, there is considerable difficulty in practice in assigning several *Pieter Faure* shells to one or the other. The above specimen is much more like *T. algoensis* in having a broad body whorl, but other specimens are more like *C. diana*e, and have been reserved for further study.

*Pleurotomella ursula* Thiele

Fig. 30 d

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 231, pl. 41 (29), fig. 3.

Aperture subequal to spire (Thiele's figure), slightly longer than spire (15 mm. specimen), or  $1\frac{1}{4}$  in spire (9 mm. specimen). Protoconch  $1\frac{1}{2}$  whorls, alt. and diam. 0.6 mm. (0.5 mm. in 9 mm. specimen), apically smooth, last half whorl with close-set fine axial pliculae. Postnatal whorls 5. Axial ribs 11 on 1st whorl, increasing to 15 on last whorl; crossed by spiral lirae 4, increasing to 5-6 on 4th and 5th whorls, intermediaries on later part of 3rd and on 4th whorl (9 mm. specimen), in 15 mm. specimen intermediaries as strong as primaries, total 12-13. Sulcus deeply sunken, with well-marked growth-lines. Lip sinus very deep, adjoining suture; outer lip expanding below sulcus. Canal short, but longer than in Thiele's figure.  $6.75 \times 3$  mm. (across shoulder of body whorl, 3.5 if outer lip included),  $9 \times 3.5$  mm. (resp. 4.5), and  $15 \times 6$  mm. (resp. 7). Thiele:  $6 \times 3$  mm.

35° 16' S., 22° 26' E., 155 metres (Thiele).

Cape St. Blaize, N. × E., 73 miles, 125 fathoms, two dead; off Cove Rock (East London area), 80-100 fathoms, one dead (S. Afr. Mus. A8559, A8701, P.F. Coll.).

*Remarks.* The largest specimen came from the East London area; all three are larger than the *Valdivia* specimen.

The protoconch does not appear quite so high as in Thiele's figure. He described it as somewhat rough. According to his 1929 diagnosis, the genus has criss-cross sculpture.

Gen. MITROMORPHA A. Adams

Subgen. *Antimitra* Iredale

*Mitromorpha (Antimitra) hewitti* Tomlin

1904. Smith. *J. Malac.* xi, p. 31, pl. 2, fig. 13 (*volva* Sow. var.).

1921. Tomlin. *J. Conch.*, xvi, p. 156.

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 48, pl. xi, no. 359 (*striolata*).

Recorded from Port Alfred and East London.

Off Cove Rock (East London area), 22 fathoms, 2 specimens from bottom sample (S. Afr. Mus. P.F. Coll.).

*Mitromorpha apollinis* Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 255, pl. 31 (19), fig. 14.

Protoconch 2 whorls, alt. and diam. 0.5 mm., smooth, junction with 1st postnatal whorl distinct. Postnatal whorls 5. Axial ribs 13-14 on 1st and 2nd whorls, increasing to 15-16 on 3rd, but evanescent on later part of 3rd and obsolete on 4th and 5th, crossing the sulcus but not the cingulum; crossed by flattened spiral lirae 3 on 1st whorl, 3-4 on 2nd, 4(5) on 3rd, 5 on 4th and 5th whorls, c. 16 additional lirae on base. Sulcus with narrow cingulum. Fine growth-lines across sulcus, and between the lirae.  $9.5 \times 3.5$ , and  $10.5 \times 3.75$  mm. Pale fawn.

$34^{\circ} 51' S.$ ,  $19^{\circ} 37' E.$ , 80 metres (Thiele).

Cape St. Blaize N.  $\times$  E., 73 miles, 125 fathoms, 2 dead (S. Afr. Mus. P.F. Coll.).

*Remarks.* Superficially like *Daphnella sulcata*, but with smaller protoconch, flatter whorls, and spiral lirae fewer on the whorls but more numerous on the rostrum. With 5 whorls the above two specimens are larger than the four obtained by the *Valdivia*. Thiele's description says 6 spiral lirae on penultimate (i.e. 3rd whorl); this includes the cingulum, but even so the present specimens appear to have one lira less because the lowest one is weaker than the others and more or less occluded by the suture of the following whorl.

*M. jovis* Thiele 1925, from the same *Valdivia* station, in spite of its slightly larger protoconch (according to the figure: 0.6 or 0.7 mm.) is extraordinarily like *apollinis*.

The third South African species described by Thiele: *M. neptuni* Thiele 1925, is very similar in sculpture to *Mangilia nympha* Bartsch 1915, but is a little larger with the same number of whorls.